# CHAPTER 4

# ENVIRONMENTAL CONSEQUENCES

The Gray Hawk, one of more than 230 bird species on the National Conservation Area, nests in large cottonwood trees.

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## INTRODUCTION

Chapter 4 presents the environmental consequences of the alternatives described in Chapter 2. (Table 2-32 presented a comparative summary of these consequences.) All environmental consequences from the alternatives are described for each resource topic. Resource topics are presented in the same order as in Chapter 3, Affected Environment. Alternative 1 (Current Management) is the environmental baseline. Under each resource topic, Chapter 4 first discusses the consequences of no change in current management (Alternative 1) and then describes changes in impacts under Alternatives 2, 3, and 4. Cumulative impacts.are addressed at the end of each resource section. The following assumptions are common to all impact analyses:

- BLM would have the funding and work force to implement the selected alternative. (But the alternatives might vary in the funding and staffing needed for implementation.)
- Short-term impacts would occur over a period of 5 years or less.
- Long-term impacts would occur over a period exceeding 5 years.
- Short- and long-term impacts are described for proposed decisions and actions on public lands under each alternative. The exception is for impacts of livestock grazing. Since BLM holds grazing leases on State Trust Lands on two allotments, Chapter 4 also addresses the impacts of livestock grazing on these State Trust Lands.
- BLM would monitor impacts and adjust management as needed in response to new data derived from monitoring.

Assumptions specific to a given resource are provided in that section. Cumulative impact assumptions are included in Appendix 4.

The following critical resource elements, as set forth in the BLM NEPA Handbook (See Appendix 5, BLM Manual H-1790-1), have been analyzed and are not present or would not be affected by implementing the alternatives:

- **Environmental Justice**--The EIS found that none of the alternatives would have disproportionate adverse human health or environmental effects on minority and low-income populations.
- **Prime and Unique Farmlands**--The planning area has no designated prime and unique farmlands.
- **Native American Religious Concerns**--Consultation with Native American tribes has found no Native American religious concerns within the planning area.
- **Indian Trust Resources**–There are no Indian Trust Resources that have been identified.
- **Hazardous or Solid Wastes**--No hazardous or solid waste sites or issues have been found within the planning area.
- **Wilderness**--The planning area has no designated wilderness areas and no public lands suitable for wilderness designation.

# IMPACT ANALYSIS BY RESOURCE TOPIC AND ALTERNATIVE

## PHYSICAL RESOURCES AND PROCESSES

### Impacts to Air Quality

The impacts to air quality under any of the alternatives would be minimal. Restricting vehicle use on some roads under Alternatives 2, 3, and 4 would slightly improve air quality in the short-term. Prescribed fire as part of integrated vegetation treatment under Alternatives 2, 3, and 4 would degrade air quality over the short-term. BLM expects no cumulative impacts on air quality.

### Impacts to Water Resources

**Scope of Analysis**: Impacts to watershed include effects on watershed resources and processes including soils, groundwater, surface water, and vegetation cover.

#### *Impacts to Watershed*

#### *Impacts to Watershed from Alternative 1 (Current Management)*

##### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*

Under current management, soils would remain stable for the short-term, but soil erosion would tend to increase over time due to continued livestock grazing, exclusion of wildfire, and lack of integrated vegetation treatment. Desirable perennial grasses would decrease with the increase in brush. The resulting increase in bare ground would allow increased runoff of precipitation and increased sedimentation.

With little or no concerted efforts to treat upland vegetation and continued suppression of wildfires, shrubs would continue to invade the uplands at the expense of desirable perennial grasses as a long-term trend. As a result, herbaceous cover on the soil surface would decline with related hydrologic effects including: less infiltration, increased runoff, increased erosion, and increased sedimentation. The planning area might no longer meet Part B of the upland vegetation objective for watershed cover. Over time, increased peak flood flows and sedimentation would likely alter channel maintenance processes and adjust channels (Leopold 1994; Rosgen 1996). Possible undesirable adjustments to Cienega Creek, include bank erosion, filling of pools, and the forming of a wider, shallower stream profile. A lack of integrated vegetation management is likely to cause long-term harm that offsets gains from improved livestock management and other watershed uses.

The lands in the Babocomari watershed are likely to undergo similar harm from a lack of integrated vegetation treatment. But the public land acreage in this area is not large, and lack of vegetation treatment would not greatly influence sedimentation and runoff relationships in the Babocomari River.

*Fish and Wildlife, and Cultural Resources Management*

Current management would not affect watershed condition and function. But the presence of endangered species or cultural resources and required mitigation might constrain and add costs to implementing watershed improvement projects.

*Visual Resource Management (VRM)*
Management as VRM Class III might constrain and add costs to implementing projects that benefit watershed conditions.

**From Land Use Allocations**

*Mineral Development*
Mineral development would not disturb watershed conditions in most of the planning area under Alternative 1, because BLM has not opened the lands acquired in 1988 to mineral entry (48,542 acres or 33% of the watershed). But 458 acres of BLM surface estate and ~~5,915~~ 7,167 acres of subsurface mineral estate could be mined. Before BLM would authorize a mine that would exceed five acres, the mine operator would have to prepare a mining plan of operations with mitigation and site-specific environmental review. Oil and gas development and small-scale (casual use) mining, including the building of access roads and the disturbing of mining sites, are likely to directly harm watershed health. The development of a large-scale mine or the proliferation of small-scale mineral development in the planning area is likely to disrupt hydrologic processes which influence erosion, deposition, and stream function; reduce ground and surface water quantity; and lower water quality.

Large mines often require an influx of development to support operations. The expansion of residential and commercial areas for large-scale mining is likely to lessen ground water resources. A corresponding increase in the use of the planning area is likely to disturb watersheds by generating wildcat roads, increasing number of campsites, increasing localized trampling, and increasing the incidence of wildfire. The harm could be negligible to severe, depending on the scale, potential for mitigation, and location and type of mine.

*Utility Rights-of-Way and Land Use Authorizations*
New utility lines could cause short- and long-term harm by disturbing watersheds, mainly from development and service roads. Soil disturbance can be partially mitigated by treatments, including proper engineering of maintenance road drainage and revegetating of disturbance after construction or maintenance. But residual impacts such as service roads are likely to increase runoff, erosion, and sedimentation in the long-term as new corridors proliferate.

Lack of designated utility corridors could help proliferate utility lines in the planning area. It is unknown how many lines would be approved or the locations. However, right-of-way construction for doubling the existing lines, for example, would disturb about 540 acres of watershed in the short-term on public lands. More long-term disturbance from associated service roads is also expected.

*Off-Highway Vehicle Management*
Limiting off-highway vehicle (OHV) travel to designated roads would protect the soil from cross-country vehicle traffic. OHV control would directly benefit watershed condition.

*Road Designations*
The planning area's ~~136.4~~ 134.7 miles of roads (e.g., open and restricted to administrative use) amount to ~~198~~ 196 acres of disturbed watershed in the Upper Cienega Creek and Upper Babocomari River basins. Under Alternative 1 this small acreage of roads on relatively stable upland soils would only slightly harm watershed function and promote sedimentation when properly maintained to BLM standards. But the use of 11 fords that cross Cienega Creek on fragile soils directly promotes erosion and sedimentation. These crossings concentrate recreation and extend the area of soil and vegetation disturbance and, therefore, disturb watershed function.

*Recreation Management*

Alternative 1 would establish no recreation zones. Unrestricted camping, hiking, and hunting would cause some small-scale disturbance to the watershed. Group events would need permits with stipulations that would partially mitigate impacts. Revegetation of sites damaged from heavy use would further mitigate impacts. Few group sites would cause watershed damage and such sites would be small.

Areas of concentrated recreation use on public lands currently affect about 20 acres with loss of or reduced vegetation cover and compacted soils. Recreation use is light in the riparian area along Cienega Creek and Mattie Canyon, but is heavy enough in Upper Empire Gulch to cause some trail and light bank damage.

Recreation is growing in the planning area. Under Alternative 1, visitors are likely to camp and create more unauthorized trails in riparian zones. The density of campsites is likely to increase. Bank damage is likely to start erosion on these fragile soils.

*Arizona Trail*

Under Alternative 1, the Arizona Trail would not cross the planning area and would therefore not affect watershed conditions.

*Administrative Sites*

Designating four administrative sites in areas with existing buildings would continue the more intensive uses at these sites and result in about 105 acres of watershed disturbance.

*Livestock Grazing*

***Empire-Cienega Allotment***

Under current livestock grazing management, data show that watersheds on the Empire-Cienega allotment are in satisfactory condition with adequate cover and a stable trend (See Chapter 3, Affected Environment, **watersheds**). Nonetheless, watersheds exposed to moderate grazing have decreased infiltration rates which result in increased runoff from storm events (Gifford and Hawkins 1978). Studies in Dadkhah and Gifford (1980) in the intermountain West found that livestock trampling lowers infiltration rates, but regardless of trampling, sediment yields remain uniform after grass cover reaches 50%. Data from 1991 on the existing watershed condition shows that the current cover averages 57% in the planning area. In desert settings, soil compaction might be offset by invertebrates that aerate and loosen soil (e.g., termites and ants) where plant litter is maintained in sufficient quantities to support large populations of invertebrates (Whitford et al. 1995).

In the long-term, current grazing management should benefit watershed and condition in many areas. An increase in plant density would do the following:

- Increase retention of precipitation and attenuation of floods.
- Increase moisture infiltration into the upland soils and alluvium in ephemeral channels.
- Decrease the upland runoff rate.
- Ultimately recharge the groundwater.

Intense, short-duration grazing, coupled with the resting of pastures, flexible stocking rates, **and vegetation treatments**, would likely improve vegetation cover on the watershed. The current grazing strategy provides a large measure of protection to watershed conditions by the following:

- ~~Continuously~~ Monitoring pasture productivity and use.
- Implementing suitable stocking rates (0-~~13~~ 14 head/section).

- Rotating pastures to minimize the deterioration of plant and litter soil cover types.

However, the current allowable utilization of 40-60% under the interim grazing plan is higher than that recommended by Holechek et al. (1998) to provide sustainable use compatible with maintaining or improving watershed condition. BLM lacks sufficient utilization data to determine if it has achieved this objective on the Empire-Cienega allotment. A lack of vegetation management is likely to result in long-term harm that offset gains made from improved livestock management and other watershed uses. The risk of damaging vegetation during extended drought is likely to be negated by reducing stocking rates and leaving pastures as reserve forage.

Excluding **about** 450 acres from livestock grazing along Cienega Creek, Mattie Canyon, and Empire Gulch prevents disturbance of fragile bank vegetation and soils. Winter-only grazing in northern pastures that includes two miles of Cienega Creek greatly limits stream bank alteration and sedimentation and benefits soil stability. Livestock using these pastures into April, especially during warm, dry winters, have damaged stream banks. A small negative impact has resulted from a limited amount of bank erosion and sedimentation in some years. Future fencing proposed by the existing interim grazing plan would nearly eliminate the altering of stream banks by livestock.

Over the long-term, stock tanks are likely to harm watershed function and condition. Use of 30+ earthen stock tanks on the Empire-Cienega allotment could disturb up to 1,800 acres (3 $mi^2$) (Andrew 1988). But because of the short duration of use, the area disturbed is likely to be less than a third of this amount. The impact would be spread out over the entire allotment. Stock tanks are likely to produce long-term harm to watershed function and condition.

The first phase of building more fencing under Alternative 1 on the Empire-Cienega allotment would not significantly disturb vegetation. The fence lines would not be bladed and as little brush as possible would be cut. Fencing for crossing lanes would have to be rebuilt periodically when damaged by flooding. Little fencing would be required for crossing lanes (300 feet of fence per crossing) and any rebuilt fencing would be routed to avoid vegetation. Fence lines would not need to be cleared. No vehicles would be used in the riparian areas during construction or repair.

Livestock's intermittent use of six existing crossing lanes when moving to fresh pastures would damage vegetation and stream banks for a short period without long-term disturbance because livestock do not use crossing lanes **for more than 10 days annually** ~~year round~~. The rebuilding, repair, and livestock use of crossing lanes **could have varied impacts from those which** are likely to only negligibly degrade watershed and condition **to more major negative impacts, particularly if headcutting is initiated.**

**Use of the Narrows riparian watering area occurs in the non-growing season (between December 1-April 1, depending on the cattle rotation for that year) and use of A & B riparian watering areas occurs predominately during the non-growing season (between December 1-May 1, depending on the cattle rotation for that year). The riparian watering areas are about 8.6% of the total riparian area. Livestock use of these riparian watering areas will result in some damage to stream bank vegetation and banks from trampling. Some consumption of riparian vegetation may also occur in some years at the end of the use period, depending on when the vegetation begins to leaf out and green up which can occur by March 1 in warm, dry winters. Recent monitoring has shown that these riparian areas are either in proper functioning condition or in an upward trend toward proper functioning condition**

The grazing strategy is the same on about 37,460 acres of leased State Trust Lands contiguous to BLM-managed public lands. The watershed condition on these lands is likely to have the same level of impacts as BLM-managed lands with the same results to watershed condition. Because BLM would manage such a large portion of the watershed to maintain good watershed cover and healthy vegetation, about 74,150 acres or 51% of the Upper Cienega Creek watershed is expected to have satisfactory conditions that limit excessive erosion, stream sedimentation, and flooding while promoting rainfall retention and groundwater recharge.

But in the uplands, grazing (along with other factors) in the absence of vegetation treatments, such as prescribed fire, is likely to slowly facilitate the increased proportion of shrubs such as mesquite and burroweed (National Research Council 1994; Bahre 1995). The result would be more exposed soil surface subject to increased rates of erosion.

***Empirita, Rose Tree and Vera Earl Allotments***

For the Rose Tree, Vera Earl, and Empirita allotments watershed health has not been determined. Alternative 1 would adjust grazing, if needed, to meet the upland objective.

The current allowable utilization of 40-60% is higher than that recommended by Holechek et al. (1998) to provide sustainable use compatible with maintaining or improving watershed condition. BLM lacks sufficient utilization data to determine if this objective has been achieved on the Empirita, Vera Earl, or Rose Tree allotments.

The risk of damaging vegetation, during extended drought, is likely to be negated through stocking rate reduction and leaving pastures as reserve forage on the Empirita allotment under the current grazing plan. But on allotments with fixed stocking rates, during extended drought, this grazing strategy is likely to degrade the watershed if plants lose vigor due to persistently low soil moisture and continued grazing at fixed levels. The result in the short-term would be large reductions in watershed condition and function. Some of these impacts may persist over the long-term.

The Safford Field Office drought policy used by the Tucson Field Office allows for heavy use (60%) when plants are water stressed. In addition, the policy restricts the use of current year's grass production to 60%. But this policy does not consider that in a drought there might be little or no production during the current year and the rotation of livestock is using last year's production a second time.

Implementing range developments in the Empirita Grazing Plan under Alternative 1 would result in a minimal reduction in watershed condition. The first phase of building more fencing on the Empirita allotment would not significantly disturb vegetation. The fence lines would not be bladed and construction would cut as little brush as possible. The impacts would be short-term and negligible. The fence would be routed to avoid vegetation. Fence lines would not need to be cleared. No vehicles would be used in the riparian areas during construction.

The first phase of building 7.25 miles of pipeline with water troughs would disturb small tracts of upland vegetation and up to 7.5 acres of soil. Fencing for Nogales and Little Nogales Springs and ¼ mile of Cienega Creek at the Narrows would eliminate potential watershed disturbance in the fragile riparian areas where disturbance can accelerate soil erosion. Impacts from range developments on the Rose Tree and Vera Earl allotments would be similar to those described for the Empire-Cienega and Empirita ranches. The exact nature and degree of impacts from these actions would be analyzed in future environmental analysis for specific proposals.

**From Special Designations**

*Areas of Critical Environmental Concern*
By not designating ACECs, Alternative 1 might limit the emphasis placed on maintaining the planning area's ecological integrity which affects watershed function. Lack of ACEC designation might reduce the options for resolving management issues related to mixed ownership patterns in the watershed, and indirectly affect relationships, such as water runoff rate (flooding), soil erosion rate, and water infiltration rate. These relationships in turn affect: soil moisture; soil productivity; aquifer recharge; sedimentation of stream channels; and stream channel width, depth, and shape. ~~BLM could not acquire State Trust and private lands through the Land and Water Conservation Fund.~~ **Prior to NCA designation, lack of an ACEC designation might have made it difficult to acquire additional lands or conservation easements in the planning area. Lack of an ACEC designation would also result in not highlighting the area for certain budget requests which could direct more agency resources to the area.** Without some of the management changes prescribed under ACEC designation, a variety of activities that disturb vegetation and soils would be more likely to occur on BLM-administered public lands. The lack of designation is likely to indirectly **result in the disturbance** of the vegetation cover and plant litter that protect the soil surface from erosion.

### *Summary--Alternative 1 on Watershed*

Under current management, existing and potential concentrated activities (e.g., roads, rights-of-way, administrative sites, recreation sites, and livestock developments) disturb at most 2,660 acres of public lands distributed throughout the planning area, representing only 5.5% of the public lands in the Upper Cienega Creek basin. Dispersed recreation would potentially affect all 49,000 acres of public land in the watershed. Livestock grazing would affect 41,855 acres. About ~~6,730~~ **7,265** acres of public land and federal mineral estate have the potential for being mined.

Under Alternative 1, BLM would adjust grazing, if needed, to meet the upland vegetation objective . But BLM is likely to meet with limited long-term success without integrated vegetation treatments and, in some cases, changes in the drought policy. Utility rights-of-ways would likely proliferate in the basin as the population continues to grow and new technologies are distributed to rural areas, degrading watershed condition. Mining for locatable and leaseable minerals and mineral material sales could degrade watershed condition over large areas in the Cienega Creek basin and to a lesser extent in the Babocomari basin. The current level of dispersed recreation is resulting in limited watershed disturbance. If not regulated, recreation would likely increase dramatically with time. Alternative 1 might fail to meet the upland vegetation and riparian objectives in the long-term.

### *Cumulative Impacts--Alternative 1 on Watershed*

Under current management, the watershed of Cienega Creek would remain stable and functional over the short-term. In the short-term, current grazing management would continue to maintain and improve watershed condition on 64,649 acres of State Trust Lands in addition to the 41,855 acres of public lands. Impacts of concentrated uses, including roads, utility lines, and range improvements, would occur on both public and State Trust Lands at about the same levels.

**The implementation of the existing Land Tenure Plan Amendment to the Safford District RMP which is carried forward in this plan will help preserve watershed conditions inside the NCA and surrounding basin, resulting in a long-term positive impact. If this land is not purchased for conservation, future developments of private**

and State Trust Lands in the area is a near certainty as the human population in southern Arizona continues to grow. Large scale development can change runoff and sediment relationships resulting in the destabilization of stream channels (Dunne and Leopold 1978).

Over the long-term watershed condition would tend to deteriorate. Trees and brush would tend to increase over the perennial grasses in the plant communities. Operating cattle ranches would continue to be subdivided for residential development. Road networks would expand. And drainage patterns would tend to be channelized. The result of this slow unplanned development would be the following:

- Less open space.
- Decreased infiltration of precipitation into the soil profile.
- Increased surface runoff.
- Higher peak flood flows.
- More rapid transport of water through the watershed.
- Less aquifer recharge.
- Briefer surface flows in Cienega Creek.
- Less water held in the watershed.

Recreation uses would continue to expand as urban dwellers seek escape from cities. Land use authorizations would also tend to increase. As people move out to the Sonoita area, the demand for rights-of-way to access private lands would increase as would the need to bring utilities to new homesites.

## *Impacts to Watershed from Alternative 2*

### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*

The ~~activity plan~~ actions common to Alternatives 2, 3, and 4 would determine the cause of erosion in lower Wood Canyon and take steps to reduce or stop the erosion. These action alternatives would also repair abandoned stream crossings and other disturbed locations on stream banks and terraces along Cienega Creek and its tributaries. This repair would reduce the level of sedimentation entering Cienega Creek and conserve productive soil resources. Roads found to contribute to excess sedimentation would undergo design changes to prevent further erosion.

BLM is working with other land owners in the watershed to promote watershed health, which benefits public lands by reducing excess sedimentation and flooding and retention of rainfall. As a result, infiltration and groundwater recharge would increase on downstream public lands. In the long-term watershed management is expected to benefit watershed conditions.

Management actions common to ~~the activity plans for~~ Alternatives 2, 3, and 4 would have a distinct advantage over Alternative 1 by improving watershed condition and meeting the upland and riparian objectives. Vegetation treatments (e.g., prescribed fire, fuel wood cutting, and herbicides) on ~~almost~~ up to 20,000 acres (14% of the watershed), identified as needing treatment through Ecological Site Inventories, would improve watershed condition over the long-term by reducing and slowing the spread of the shrubs in favor of the herbaceous plants. Treatments on additional acreage would be proposed, as a result of monitoring, and would have similar benefits when implemented. Dense perennial grass cover is important to watershed health and related hydrologic and soil

stabilizing processes. The treatments would mitigate the effects of livestock grazing (Alternatives 2 and 3) on ecological sites where livestock promote shrub invasion. **Setting guidelines** ~~Requiring permits~~ for collecting plants would help prevent the unneeded disturbance from over collecting vegetation. The over collecting could harm areas especially sensitive to erosion (i.e., soils in bottom lands) **but plant collections would likely result in small scale impacts**.

~~But~~ Prescribed fire might cause localized short-term harm by increasing erosion rates before vegetation soil cover returns. This type of impact would be largely mitigated by the following:

- Controlling fire intensity.
- Controlling the size of burn units.
- Sequencing units burned annually to spread out impacts over large areas and at different times.
- Ensuring adequate rest from grazing after burning.

Individual burn plans for each year would incorporate this mitigation to protect sensitive areas and reduce post-burn erosion. Thus, the spreading out of prescribed fire over space and time would buffer the watershed, especially stream channels from excess sediment and ash.

Under Alternative 2, BLM would implement an integrated vegetation management treatment strategy to include all the public lands in the planning area. This strategy would also encourage collaboration by adjacent land owners in designing treatments that include suitable State Trust and private lands to create the most logical and economic units possible. The strategy would be to maintain current ecological site inventories which would determine existing ecological condition. If the current soil and vegetation conditions are not highly similar to desired conditions, BLM would design and implement a vegetation treatment.

This strategy would maintain the desired soil and vegetation conditions on public lands as well as suitable State Trust and private lands. This strategy would tend to look at the entire watershed and direct resources from multiple partners to improving conditions where the changes are most needed to improve watershed health and function.

*Fish and Wildlife Management*

Under Alternative 2 in the long-term, habitat improvements would enhance vegetation structure and increased cover would promote healthy watershed conditions.

*Visual Resource Management (VRM)*

Visual resource management as VRM Class II under Alternative 2 would place more constraints, and potentially more costs, on watershed projects than under current management, including vegetation treatment and restoration.

*Cultural Resource Management*

Under Alternative 2, cultural resource management might slightly harm watershed condition and function. Developing the Empire Ranch headquarters would likely attract increased visitation and general recreation, such as camping and hiking. The result would be more vegetation and soil disturbance. Specific site design would reduce erosion and any uncontrolled runoff from the headquarters. Visitors and staff would increase the amount of water used at the headquarters from that under Alternative 1. Public education and interpretative programs on the watershed would increase awareness of the issue and might improve visitor behavior.

**From Land Use Allocations**

*Mineral Development*

Under Alternative 2, watershed stability is likely to benefit in the long-term from restrictions on mineral development of acquired public lands and the continued closure ~~and withdrawal~~ of 48,542 acres **and withdrawal of 7,265 acres** (together representing ~~33~~ **38**% of the **Upper Cienega Creek** watershed) to mineral development. Restricting mineral development would ensure that extensive mining would not compromise watershed integrity through surface disturbance and water quality through inadvertent release of toxic materials (Nelson et al. 1991). The administrative ~~and casual~~ use of a limited amount of sand and gravel, boulders, and clay is likely to inflict small to negligible harm on watershed function and condition.

*Utility Rights-Of-Way and Land Use Authorizations*

Alternative 2 would restrict utility rights-of-ways to two existing corridors, whereas Alternative 1 would allow for corridors to proliferate across the landscape, spreading disturbance and maintenance roads. More utility development on public lands along the El Paso gas line is likely to disturb at most 30 acres of public lands over the short-term as underground utilities are installed. Service roads could disturb another acre of public lands in the long-term, slightly degrading watershed condition.

Designating a second utility corridor across, three miles of public lands with existing overhead utility lines would disturb at most 240 acres in the short-term. In the long-term disturbance from service roads would amount to about one acre of public land. In the short-term, placing utility lines to capacity in the two corridors and allowing utility lines to cross other jurisdictions in the same capacity would disturb at most 270 acres of public land and 1,280 acres total in the watershed (0.8 % of the watershed).

New and existing service roads in the long-term would disturb two acres of public lands and 45 acres of other lands in the watershed. Treatments such as the following could partially mitigate soil disturbance: (1) proper engineering of maintenance road drainage, and (2) revegetating disturbance after construction or maintenance. But residual impacts, such as service roads are likely to increase runoff, erosion, and sedimentation. This level of disturbance is likely only to slightly disrupt watershed conditions in the long-term.

*Off-Highway Vehicle Management*

Impacts under Alternative 2 would be the same as under Alternative 1.

*Road Designations*

Under Alternative 2 the road network (e.g., open, seasonal use, and restricted to administrative use) would total 122 miles and disturb 177 acres of watershed. The presence of 6.6 miles of nonmotorized single track (converted from roads) would disturb 4.8 acres of watershed. Under Alternative 2, BLM would retire and rehabilitate ~~16~~ 13.7 miles or ~~23.2~~ **20** acres (~~12~~ **10**%) of the planning area's ~~136.4~~ 134.7 mile (~~198~~ **196**-acre) road system. **Design and maintenance of the road system will be improved on those road segments that are identified as contributing to erosion.** These actions would benefit watershed health by stabilizing road segments threatened by erosion. Many of these segments lie along stream banks and in floodplains along Cienega Creek **but occur in upland areas as well.**

*Recreation **Management***

Recreation management described for Alternative 2 is likely to benefit watershed in the long-term and would help meet the upland vegetation objective. The level of impact from

recreation is difficult to estimate. At least a few thousand people use the planning area annually. Establishing recreation zones under Alternative 2 would limit the extent of camping-related soil disturbance on 4,613 acres (3% of the watershed) which will become important in the long-term as visitation increases. The remaining 44,387 acres (30% of the watershed) of public land would remain open to dispersed recreation including camping, hiking, and hunting.

At first, dispersed recreation would only slightly disturb the watershed. But disturbance would likely increase over time as visitation increases into the tens-of-thousands annually. BLM would have to monitor the extent of impacts and consider further restrictions to sustain watershed conditions that will meet the upland objective. Recreation under Alternative 2 would harm watershed conditions slightly to moderately, depending on the level of use.

Several **management** actions under ~~the activity plan~~ **Alternative 2** would substantially benefit soil stability which is important to watershed conditions. Restrictions on gold prospecting and on camping and group activities in riparian areas would lessen the potential for bank disturbance and channel degradation. Establishing three group sites, four camp areas, and at least 11 pullouts would disturb vegetation cover and soil on 37 acres. Foot and vehicle travel to and around these sites would likely disturb more acreage.

*Arizona Trail*

Building the Arizona Trail under Alternative 2 would disturb four acres of watershed. Associated camping sites and wildcat spur trails would disturb more areas. This disturbance would only slightly harm watershed function when compared to no trail under Alternative 1.

*Livestock Grazing*

***Empire-Cienega and Empirita Allotments***

On these two allotments, livestock grazing management under Alternative 2 would improve watershed conditions and help meet the upland and riparian objectives better than would Alternative 1. Adaptive management of livestock numbers and rotation systems adjusted for current grass production would likely improve soil cover conditions and stability. A formal interdisciplinary Biological Planning Team, coupled with more intensive monitoring, would allow for improved grazing management over time as described for Alternative 1.

Planning pasture rotations and stocking rates not to exceed an average of 35% utilization (moderate use level) of the current year's production in semidesert grasslands and meeting cover requirements under the upland objective are likely to allow sustainable use compatible with maintaining or improving watershed condition in the short-term (Holechek et al. 1998).

Vegetation treatments would improve watershed condition over the long-term by reducing and slowing the spread of the shrubs in favor of the herbaceous plants, especially perennial grasses. The risk of vegetation damage and watershed degradation, during extended drought, is likely to be negated by reducing the stocking rate and leaving pastures as reserve forage in response to current range condition and productivity. The grazing strategy would also improve the condition of intermingled State Trust Lands that would be managed with BLM lands as one unit.

The further exclosure of grazing along riparian areas on Cienega Creek and at Nogales and Little Nogales Springs, where soils are fragile and stabilized entirely by vegetation, would extend protection of these sensitive areas. Adding an extensive amount of exclosures (**about** 2,319 acres under Alternative 2 versus **about** 659 acres under Alternative 1) on the watershed in different range sites would allow for a comparison of conditions, including soil cover and soil stability in relation to grazing

management, as recommended by Bock and Bock (1993).

***Rose Tree Ranch and Vera Earl Allotments***
On these two allotments, grazing management under Alternative 2 would eventually improve watershed conditions and help attain the upland and riparian objectives better than would Alternative 1.

Obtaining information on ecological site types and condition would allow formulating a stocking rate and rotation system that is adaptive to current watershed conditions and grass production. When coupled with vegetation treatments, the stocking rate and rotation system would likely improve soil cover and stability over the long-term.

This strategy should present only a slight risk of watershed degradation during extended drought. Implementing about 600 acres of exclosures on the Rose Tree and Vera Earl allotments (none under Alternative 1) in different ecological sites would allow for a comparison of conditions, including soil cover and soil stability, in relation to grazing management, as recommended by Bock and Bock (1993).

***Empire Mountains Allotment***
The creation of a new allotment in the Empire Mountains could degrade watershed condition. Depending on soil conditions, some level of watershed impairment from even moderate levels of grazing is likely to decrease infiltration and increase runoff (Gifford and Hawkins 1978). On the other hand, the proposed vegetation treatments would likely improve watershed condition over the long-term by reducing and slowing the spread of the shrubs in favor of herbaceous plants. Dense perennial grass cover is important to watershed health and related hydrologic and soil-stabilizing processes. The treatments would mitigate the effects of livestock grazing on ecological sites where past livestock grazing has promoted shrub invasion. Implementing a flexible stocking rate based on the current year's production and rotation of season of use of pastures would prevent over using vegetation during droughts. These measures are thus expected to maintain the improvements in grass composition and density resulting from vegetation treatments. Exclosing about 480 acres from livestock grazing in the Empire Mountains allotment in different ecological sites would allow for a comparison of conditions, including soil cover and soil stability, in relation to grazing management, as recommended by Bock and Bock (1993).

Watershed condition might decline on the allotment if adjacent land owners prevent the implementing of vegetation treatments proposed to restore shrublands to grasslands because of "urban interface" issues related to prescribed fire. Grazing this allotment without vegetation treatments would likely increase the rate of shrub invasion and contribute to watershed degradation. The result would be a small to moderate decline in watershed integrity. In this case, the allotment might not meet BLM's Arizona Standards for Rangeland Health and Guidelines for Grazing Administration. This failure could lead to the allotment's eventual discontinuation.

**From Special Designations**

*Areas of Critical Environmental Concern*
Designating a 45,859-acre (31% of watershed) ACEC would benefit the planning area by emphasizing the protection of its unique ecology. Protecting watershed function and maintaining good watershed conditions are essential to supporting the area's rare biotic communities (Fleischner 1994) and especially aquatic communities (Amour et al. 1991; Meehan 1991). ACEC designation would facilitate the acquiring of more lands or conservation easements, which would allow watershed health to improve over a larger

proportion of the planning area. The ACEC designation would likely direct more agency resources to conserving the planning area's watershed.

***Summary--Alternative 2 on Watershed***

Under Alternative 2, the watershed of Cienega Creek would remain stable and functional over the short-term and possibly the long-term. This alternative proposes concentrated activities (e.g., roads, rights-of-way, administrative sites, recreation sites, and livestock developments) that could disturb as much as 2,400 acres of public lands distributed throughout the planning area, representing only about 5% of the public lands in the Upper Cienega Creek basin. Dispersed recreation impacts would potentially occur on 44,387 acres of public lands. Livestock grazing impacts would occur on 42,155 acres of public lands. Another ~~6,730~~ 7,265 acres with the potential of being mined are proposed for mineral withdrawal under Alternative 2, subject to valid existing rights. The withdrawal would virtually eliminate the risk of impacts from mineral development.

Alternative 2 places more emphasis on maintaining and improving overall watershed health than do Alternatives 1, 3, or 4 because of its emphasis on ecosystem management and collaboration. Improving watershed condition while limiting disturbance, the proposed management for Alternative 2, would include the following provisions:

- Closing selected roads.
- Closing the planning area to mining (except for valid existing claims).
- Allowing flexible livestock stocking rates.
- Establishing exclosures for 15% of rangelands.
- Restricting recreation.
- Designating an extensive ACEC to protect the ecological integrity of the entire planning area.

These provisions would help meet upland vegetation and riparian objectives in the short- and long-terms in most of the planning area when coupled with the following management actions common to ~~activity plans for~~ Alternatives 2, 3, and 4:

- Applying vegetation treatments to increase grass and limit shrubs.
- Restricting riparian camping.
- Not allowing sand and gravel sales.
- Coordinating watershed management with other entities.
- Preventing excessive erosion in Wood Canyon.

Applying the proposed grazing systems to State Trust and private lands that are part of the BLM grazing allotments would ultimately benefit watershed condition in the following ways:

- Open space would be maintained.
- More precipitation would infiltrate the soil profile reducing surface runoff and peak flood flows.
- Aquifers would be more thoroughly recharged.
- Cienega Creek would have longer periods of surface flows.
- Periods of high soil moisture would last longer across the watershed (See Cumulative Impacts section below).

Alternative 2 would meet the upland vegetation and riparian objectives by controlling shrub invasion. Coupled with improved grazing management, the control of shrubs under Alternative 2 would increase soil cover and ~~much more~~ benefit watershed condition in the long-term **much more** than would Alternative 1.

Allowing for limited administrative use of mineral materials under Alternative 2 would provide a source of materials for watershed projects. This source could lower costs while ensuring healthy watershed conditions.

Coordinating with private land owners and the Forest Service would likely improve management on adjacent lands that influence runoff and sediment entering BLM watercourses and help to meet both objectives. BLM would investigate, treat, and monitor excessive erosion in Wood Canyon to conserve soil.

### *Cumulative Impacts--Alternative 2 on Watershed*

Under Alternative 2, the Cienega Creek watershed would remain stable and functional over the short-term and possibly the long-term. In the short-term, current grazing management would continue to maintain and improve watershed condition on 64,649 acres of State Trust Lands, in addition, to the 42,155 acres of public lands with grazing in the watershed. Impacts of concentrated uses, involving roads, utility lines, and range improvements, would degrade the watershed on both State Trust and public lands. But impacts on State Trust Lands might be greater than on public lands, which would have designated utility corridors, roads, and recreation sites.

Continuing public lands grazing on the planning area's ranches would increase the likelihood that they would continue as operating cattle ranches. Such grazing would also encourage ranch families to collaborate with BLM and the Arizona State Land Department in the ranching operation and to manage State Trust and private lands they own or lease as open space. Over the long-term, improved grazing management and vegetation treatments would maintain watershed health and reduce encroaching woody species in favor of desirable perennial grasses.

The continued existence of large ranches would slow development by reducing the amount of State Trust and private lands open to residential development in the Sonoita Valley. Open space would be maintained. More precipitation would infiltrate the soil profile, reducing surface runoff and peak flood flows. More water would recharge the aquifer. Surface water in Cienega Creek would flow for longer periods. And the watershed would hold more water.

**The implementation of the proposed Las Cienegas Acquisition Strategy (Appendix 2) and the existing Land Tenure Plan Amendment to the Safford District RMP will help preserve watershed conditions inside the NCA and surrounding basin, resulting in a long-term positive impact to a greater extent than Alternative 1.**

### *Impacts to Watershed from Alternative 3*

#### From Desired Resource Conditions

*Watershed , Fish and Wildlife, Visual and Cultural Resource Management*

Impacts under Alternative 3 would be the same as under Alternative 2.

#### From Land Use Allocations

*Mineral Development*

Mineral development under Alternative 3 could affect watershed conditions more extensively than under Alternative 1. Under this alternative, ~~46,915~~ **47,807** acres of public and split-estate lands would be open to mining and mineral material sales (sand and gravel) as compared to the ~~6,373~~ **7,265** acres of public and split-estate

lands under Alternative 1. Mineral development that resulted in extensive mining would likely compromise watershed integrity through surface disturbance and water quality through inadvertent release of toxic materials (Nelson et al. 1991). But designating 4,859 acres as areas of critical environmental concern would protect the stream corridor along Cienega Creek from surface occupancy during mineral development.

*Utility Rights-Of-Way and Land Use Authorizations*

Utility rights-of-way and land use authorizations under Alternative 3 would affect watershed conditions much as under Alternative 2. In the short-term, adding a third utility corridor could disturb 13 more acres of public lands and 15 more acres in other jurisdictions within the watershed.

*Off-Highway Vehicle Management*

Impacts under Alternative 3 would be the same as under Alternative 1.

*Road Designations*

The road network under Alternative 3, (e.g., open, seasonal use, and restricted to administrative use) would total ~~125.5~~ 124.3 miles and disturb about ~~182~~ 180 acres of watershed. The ~~7.6~~ 6.8 miles of nonmotorized single track (converted from roads) trail would disturb ~~5.5~~ 4.9 acres of watershed. Under Alternative 3, BLM would close ~~11.4~~ 9.8 miles or ~~16.5~~ 14.2 acres of road, a reduction of only ~~8~~ 7% of the existing road network much less than under Alternatives 2 or 4. BLM would close roads mostly in sensitive areas along Cienega Creek. Only one road ~~crossing~~ across the perennial portion of Cienega Creek would remain and BLM would rehabilitate the rest of the crossings to reduce erosion. Road closings and improved road maintenance and design under Alternative 3 would improve watershed conditions more than under Alternative 1, but less than under Alternatives 2 and 4.

*Recreation Management*

Recreation management described for Alternative 3 is likely to have a more beneficial long-term impact than under all the other alternatives and would go further in helping to meet the upland vegetation objective. Recreation zones established under Alternative 3 would limit camping-related soil disturbance on 17,690 acres (12% of watershed). The remaining 31,040 acres (21% of the watershed) of public land would remain open to unregulated, dispersed recreation.

Under Alternative 3, dispersed recreation would only slightly disturb the watershed, but disturbance would likely increase over time. As recreation increases over time, BLM would have to monitor impacts and consider further restrictions to sustain watershed conditions that would meet the upland objective. Recreation under Alternative 3 would slightly to moderately harm watershed conditions depending on the level of use.

Establishing five group sites, five camp areas, and at least 14 pullouts would disturb soil and vegetation cover on 52 acres. Foot and vehicle travel to and around these sites would likely disturb more acreage.

*Arizona Trail*

Building the Arizona Trail under Alternative 3 would disturb five acres of watershed. Associated camping and wildcat spur trails would disturb slightly more land. Through the Narrows portion of Cienega Creek, the Arizona Trail would pass along the floodplain over soils that are fine textured and highly susceptible to erosion. Periodic flooding would degrade the trail, potentially causing secondary channels that alter stream function and contribute to sedimentation. The overall impact under Alternative 3 would be more harmful to watershed function than under Alternative 1.

*Livestock Grazing*

***Empire-Cienega Allotment***

Grazing management under Alternative 3 would be more likely to degrade watershed conditions over the long-term than grazing management under Alternative 1, because of potentially slower adjustments in drought years under Alternative 3. The average stocking rate of nine head year-long per section is conservative (NRCS 1988) and close to the annual average stocking rate under Alternatives 1 and 2. This stocking rate, variable pasture rotation, and annual deferment and seasonal rest of pastures should maintain good watershed conditions that would meet the upland vegetation objective in most years. In addition, vegetation treatments under Alternatives 2, 3, and 4 would likely prevent shrub encroachment and promote an increased cover of perennial grasses, which tends to improve watershed conditions.

Impacts from installing stock tanks, pipelines, and fencing would be similar to those described for the Empire-Cienega allotment under Alternative 1. BLM would analyze impacts from these activities in future environmental analyses for specific proposals. But during extended drought this grazing strategy is likely to degrade the watershed if plants lose vigor due to persistently low soil moisture and continued grazing at fixed levels as described in impacts under Alternative 1.

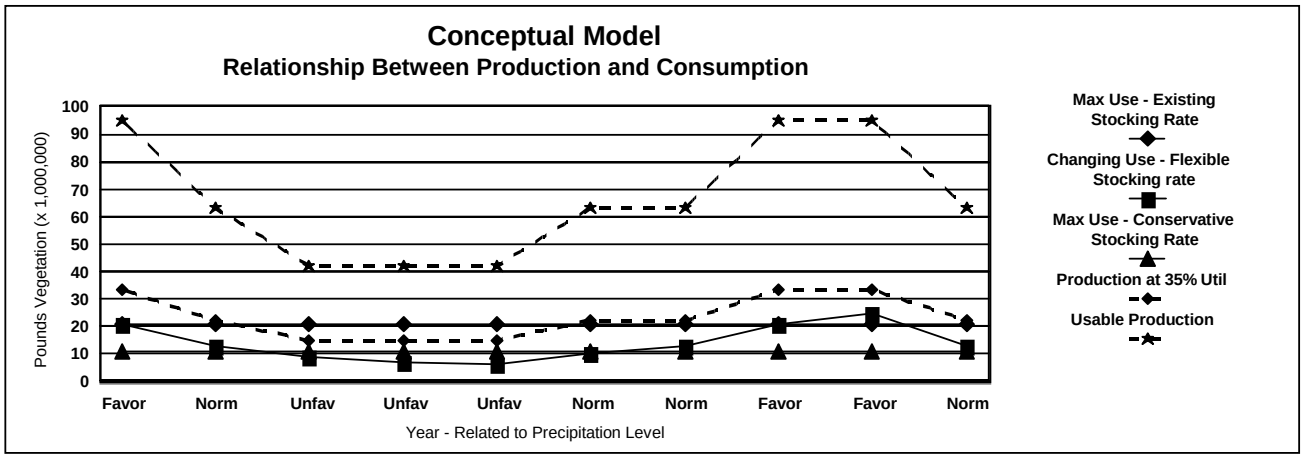
***Empirita, Rose Tree, Vera Earl, and Empire Mountains Allotments***

On all four of these allotments, livestock grazing management under Alternative 3 would affect watershed conditions much as under Alternative 1 except livestock would graze 1,040 more acres on the Empirita allotment under a variable (next best pasture) system with annual rest. BLM would implement variable (next best pasture) systems with annual rest on the other three allotments. A fixed stocking rate of seven head per section for the Empirita, nine head per section for the Vera Earl, and five head per section for the Empire Mountains is conservative (NRCS 1988).

Conservative stocking rates, pasture rotation to prevent grazing from exceeding an average of 35% utilization (moderate use level), and meeting the cover requirements under the upland objective in the short-term are likely to allow sustainable use compatible with maintaining or improving watershed condition (Holechek et al. 1998) in the short-term.

Vegetation treatments would likely improve watershed condition over the long-term by reducing and slowing the spread of shrubs in favor of herbaceous plants, especially perennial grasses. But during extended drought this grazing strategy is likely to degrade watershed conditions on the four allotments, if plants lose vigor due to persistently low soil moisture and continued grazing at fixed levels. This type of grazing management would present more risk of harming watershed condition and function over the long-term than grazing under Alternatives 1 or 2.

The potential impacts of fixed stocking rates compared to flexible stocking rates can be illustrated in a simplified model that shows the relationship between vegetation consumption by livestock at different stocking rates and ~~available~~ **useable** vegetation production (Figure 4-1). This model shows that the benefit of a flexible stocking rate (Alternative 2), coupled with adequate monitoring, has the benefit of allowing livestock numbers to be adjusted to track annual forage production. **The useable forage is that portion of the total** forage production that is accessible to livestock and can be grazed without damage to the health of the plant. It is determined by dividing the total vegetation production in half and multiplying the result by the allowable utilization rate.




This management approach minimizes the risk of using too much of the forage production that needs to be left as vegetation cover for watershed or wildlife. A large portion of the useable forage is left ungrazed so it is available for needed adjustments resulting from unexpected changes in resource conditions or other issues.

The risk of set stocking rates, even at conservative levels, is apparent. The set conservative stocking rate (Alternative 3) comes close to annual production levels ~~available~~ useable at an average 35% utilization rate, and the set maximum stocking rate currently permitted (under Alternative 1) approaches or exceeds the annual production ~~available~~ useable at a 35% utilization rate. In unfavorable years (i.e., drought) this strategy results in livestock consuming much of the annual production and leaving little cover for soil or wildlife.

**From Special Designations**

*Areas of Critical Environmental Concern*
The management of areas of critical environmental concern (ACECs) under Alternative 3 would affect watershed condition and function much as under Alternative 2, except that the scope of protection under Alternative 3 would be reduced by 90% to cover 4,859 instead of 45,859 acres. Opportunities for acquiring land would be limited. Moreover, Alternative 3 would not protect Upper Empire Gulch Spring and several other springs and seeps with special management.

***Summary--Alternative 3 on Watershed***

Under Alternative 3, the watershed of Cienega Creek would remain stable and functional over the short-term and possibly the long-term. This alternative proposes concentrated activities (e.g., roads, rights-of-way, administrative sites, recreation sites, and livestock developments) that could disturb as much as 2,440 acres of public lands distributed throughout the planning area, but representing only about 5% of the public lands in the Upper Cienega Creek basin. Dispersed recreation impacts could occur on 44,387 acres. Livestock grazing impacts would occur on ~~43,895~~ 45,375 acres. Impacts from mineral development could occur on any of the ~~46,915~~ 47,807acres open to mineral entry. Of all the alternatives, Alternative 3 least emphasizes maintaining and improving watershed health.

An ACEC to protect the ecological integrity of the riparian areas described for this alternative would likely have limited success because this alternative would risk disturbing watershed conditions, such as increased soil cover and soil stability. Alternative 3 places the watershed at substantial risk of disturbance from mining and mineral material sales (sand and gravel) while protecting the core riparian area from surface occupancy related disturbance. Road closures would be few but directed at the areas most sensitive to erosion, such as those along Cienega Creek.

Moderate grazing stocking rates, coupled with vegetation treatment, would likely improve the watershed in the long-term. But fixed grazing rates would leave watershed condition at risk of periodic injury during extended droughts (Figure 4-1). In addition, BLM would have to develop a new grazing plan if livestock grazing is not meeting the upland vegetation objective due to this potential problem. In contrast, established recreation zones would limit camping-related soil disturbance on a much larger acreage than the other alternatives, benefitting watershed conditions more than under the other alternatives.

Though less than under Alternatives 1 and 2, these actions would help meet upland vegetation and riparian objectives in the short-and long-term in most of the planning area when coupled with the following management actions common to Alternatives 2, 3, and 4:

- Treating vegetation to increase grass and limit shrubs.
- Restricting riparian camping.
- Coordinating watershed management with other entities.
- Preventing erosion in Wood Canyon.

Watershed condition would also improve as a result of using the proposed grazing systems on State Trust and private lands that are part of BLM grazing allotments. Traditionally, State Trust Lands are not managed conservatively to improve productivity or watershed conditions. These benefits under Alternative 3 would likely manifest themselves less than under Alternatives 1 or 2, but more than under Alternative 4.

### *Cumulative Impacts--Alternative 3 on Watershed*

Under Alternative 3, the watershed of Cienega Creek would remain stable and functional over the short-term and possibly the long-term. In the short-term, current grazing management would continue to maintain and improve watershed condition on 64,649 acres of State Trust Lands, in addition, to the ~~43,895~~ 45,375 acres of public lands with grazing in the watershed. Impacts of concentrated uses involving roads, utility lines, and range improvements would degrade the watershed on both State Trust and public lands. But impacts on State Trust Lands might be greater than on public lands, which would have designated utility corridors, roads, and recreation sites.

As under Alternative 2, maintaining public lands grazing on the existing ranches in the planning area under Alternative 3 would increase the likelihood of their continuing to operate cattle ranches and would encourage ranch families to collaborate with BLM and the Arizona State Land Department in the ranching operation and to manage as open space the State Trust and private lands they own or lease. ~~The ranches might be less economically viable with the more conservative stocking rate, but Alternative 3 would still tend to maintain the open space needed for wildlife and water production.~~ The continued existence of large ranch units would slow development by reducing the amount of State Trust and private lands open to residential development in the Sonoita Valley. Like Alternative 2, Alternative 3 would maintain

open space, allowing more precipitation to infiltrate the soil profile and reducing surface runoff and peak flood flows. More water would recharge the aquifer, surface water in Cienega Creek would flow for longer periods, and the watershed would hold more water than if it were developed. Over the long-term, watershed health would be maintained by improved grazing management and vegetation treatments to reduce the encroachment of woody species in the plant communities in favor of desirable perennial grasses. But fixed stocking rates would place the watershed condition at risk of periodic widespread injury during extended droughts.

**The implementation of the proposed Las Cienegas Acquisition Strategy (Appendix 2) and the existing Land Tenure Plan Amendment to the Safford District RMP will have the same long-term positive impact as described for Alternative 2.**

### *Impacts to Watershed from Alternative 4*

#### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*

**Impacts under Alternative 4 would be much the same as under Alternative 2. However,** under Alternative 4 upland vegetation conditions on public lands ~~would~~ **might** not improve as rapidly as under Alternatives 1, 2, or 3 because of the difficulties in conducting joint management activities, such as vegetation treatments under a more fragmented land management approach. ~~About 110 miles of fence would be needed to segregate BLM lands. Fencing of the public lands to exclude livestock would result in a patchwork of State Trust Land more suited for disposal than ranching.~~

**Under Alternative 4,** livestock would not graze the public lands, and **although** BLM would treat these areas to improve vegetation and watershed condition, improving the ecosystem on a large scale would be more difficult. If BLM retires the federal grazing leases and sells the state grazing leases (37,462 acres on the Empire-Cienega allotment and 23,468 acres on the Empirita allotment), due to lack of funding for obtaining commercial leases, then BLM would have little involvement in the planning or management actions on the Empirita or Vera Earl ranches due to lack of land ownership or lease agreements. BLM would then have management responsibilities on only about half of what is currently managed cooperatively on the Empire-Cienega and Rose Tree ranches.

**However, if BLM or another entity applied for and received conservation use on the State Trust lands (which is now a possibility based on a recent court decision), then it might be possible to implement the vegetation treatments and other watershed actions on more of a landscape scale under Alternative 4 as well.**

*Fish and Wildlife, Visual and Cultural Resource Management*

Impacts under Alternative 4 would be the same as under Alternative 2.

#### From Land Use Allocations

*Mineral Development*

Alternative 4 would affect watershed function and condition the same as Alternative 2.

*Utility Rights-of-Way and Land Use Authorizations*

Alternative 4 would better protect watershed function and condition than would Alternatives 1, 2, or 3, which would allow two or more corridors to be developed. The designation of a single utility corridor with existing overhead utility lines in the short- term could disturb at most 240 acres of public lands and 1,160 acres

on other jurisdictions in the watershed. The corridor could also result in continued long-term disturbance on service roads, amounting to about one acre on public lands and 14.5 acres total.

Soil disturbance could be partially mitigated by treatments, including proper engineering of maintenance road drainage and revegetating disturbance after construction or maintenance. But residual impacts such as service roads are likely to increase runoff, erosion, and sedimentation. This level of disturbance is likely only to slightly disrupt watershed conditions in the long-term.

*Off-Highway Vehicle Management*
Impacts under Alternative 4 would be the same as under Alternative 1.

*Road Designations*
Impacts under Alternative 4 would be similar to those under Alternatives 2 and 3. The road network under Alternative 4 (e.g., open, seasonal use, and restricted to administrative use) would total ~~116.4~~ 115.4 miles and disturb ~~168.7~~ 167.2 acres of watershed. BLM would rehabilitate ~~27.6~~ 25.5 miles of roads or about ~~40~~ 37 acres (~~20~~ 19%) of the planning area's ~~199~~ 196 acres of roads, including sensitive areas along Cienega Creek. Only one road would continue to cross **a perennial reach of Cienega Creek** ~~the creek~~. Rehabilitating the other crossings would reduce erosion. The ~~29.6~~ 31.1 miles of restricted use roads would help prevent wildcat roads in sensitive areas on the watershed. **Reduction of wildcat road proliferation, creek crossings and improved road maintenance and design will have a beneficial impact on watershed conditon.**

*Recreation Management*
Recreation under Alternative 4 would disturb watershed conditions less than under Alternative 1, but potentially more than under Alternatives 2 or 3. Recreation zones would limit camping-related soil disturbance on 3,270 acres (2% of the watershed). The remaining 45,730 acres of public land would remain open to dispersed recreation, including camping, hiking, and hunting. Such recreation would only slightly disturb the watershed at first, but disturbance would likely increase over time. As under Alternative 2, recreation under Alternative 4 would harm watershed conditions slightly to moderately, depending on the level of use.

Establishing one group site, four camp areas, and at least 10 pullouts would disturb about 27 acres of vegetation cover and soil. Foot and vehicle travel to and around these sites would likely disturb more acreage.

*Arizona Trail*
Routing the Arizona Trail along existing roads would eliminate more disturbance of watershed surface area from construction. Some wildcat spur trails would negligibly disturb land along the trail. Locating the trail under Alternative 4 would affect watershed conditions much as under Alternative 1.

*Livestock Grazing*
Under Alternative 4, livestock grazing would cease on 41,855 acres of BLM-managed land or 29% of the Upper Cienega Creek watershed. This area would meet the upland vegetation objective and benefit watershed function and condition for public lands under Alternative 4 more than it would under Alternative 1. This would not **necessarily** be the case on adjacent State Trust and private lands.

Some of the residual effects of grazing, which include soil compaction, mesquite (shrub) invasion, and trail building by cattle (which increases erosion), would fade over time **on public lands**. Stock tanks and other developments would be removed or abandoned. Livestock would no longer degrade the 3 $mi^2$ of watershed around the 30+ stock tanks. Fence and water line construction and repair would no

longer be needed and would no longer disturb the watershed. The network of cattle trails that span the 41,855 acres would heal. Vegetation treatments would reverse shrub invasion over much of the area, although implementing the vegetation treatments could be more difficult.

Livestock would no longer consume plant biomass that serves as soil cover and forage used by invertebrates, which loosen soil. The result would be increased water infiltration into the soil, increased soil moisture, and decreased runoff and erosion over the long-term.

There are several scenarios which could occur relating to the State grazing leases held by BLM with differing impacts. BLM could sell the state grazing leases, it could obtain the resources to pursue a commercial permit, or it could apply for conservation use on State Trust lands.

If BLM sells the grazing leases, grazing would likely continue on State Trust and private lands, but BLM would no longer be involved in these livestock operations. Livestock management on these nonpublic lands could cause a decline in overall watershed condition, if they were stocked at higher levels to make up for the loss of federal lands for grazing. This decline in overall watershed condition would disturb BLM lands and the riparian and aquatic habitats of Cienega Creek. But BLM would not have input into grazing management on these lands.

If grazing continues on intermixed State Trust and private lands, BLM would need to fence the public lands to keep out livestock. If all the public lands, including the many scattered parcels, were fenced to exclude livestock about 110 miles of fencing would be needed. However, by utilizing existing fencing, livestock could be excluded from about 50% of the public lands including most of the riparian areas without the need to develop additional fencing.

Other fencing configurations could be utilized to fence out the majority of public lands with about 40-50 miles of fencing.

In addition to the required fencing, BLM would have to assume the maintenance responsibility for the new fencing as well as for the existing boundary fencing. BLM's experience in managing the San Pedro Riparian National Conservation Area also shows the need for hiring more staff to detect and resolve unauthorized grazing use on the public lands excluded from grazing, if surrounding lands are grazed. If the State Trust and private lands surrounding the public lands are not being grazed, then these grazing trespass costs would not be incurred. The fencing, fence maintenance and trespass monitoring costs incurred by BLM under Alternative 4 would therefore be variable. However, if BLM or another entity applied for and received conservation use on the State Trust lands (which is now a possibility based on a recent court decision), then the watershed impacts might be different. Improved watershed conditions would occur on both BLM and State Trust lands over the long-term.

Watershed conditions would be more severely disturbed if private ranches or State Trust Lands are developed for housing or commercial uses (See Cumulative Impacts below).

#### From Special Designations

*Areas of Critical Environmental Concern*

ACEC management under Alternative 4 would affect watershed function and condition the same way as under Alternative 2.

### *Summary--Alternative 4 on Watershed*

Under Alternative 4, the Cienega Creek watershed would remain stable and functional over the short-term and possibly the long-term. Alternative 4 proposes concentrated activities

(e.g., roads, rights-of-way, administrative sites, and recreation sites) that could disturb as much as 540 acres of public lands throughout the planning area. This amount represents only 1% of the public lands in the Upper Cienega Creek basin. Dispersed recreation could affect 45,730 acres. Livestock grazing impacts would be eliminated over the long-term on 41,855 acres. Alternative 4 proposes the withdrawal of another ~~6,730~~ 7,265 acres, with the potential of being mined, subject to valid existing rights. Such a withdrawal would virtually eliminate the risk of impacts from mineral development.

Of all the alternatives, Alternative 4 most emphasizes maintaining and improving watershed health on the public lands. But these benefits to watershed condition would be offset on State Trust and private lands that revert to traditional livestock grazing that does not emphasize watershed condition. These benefits would be even more offset if State Trust and private lands are sold for development because the loss of public land grazing has caused their grazing operations to lose their economic viability. **However, if conservation use is applied to the State Trust lands or if BLM acquires the lands and removes grazing, then the impacts described for the public lands would also be expected to occur on the State Trust lands.**

Alternative 4 would designate an ACEC to protect the ecological integrity of the entire planning area. By the following actions, BLM would minimize disturbance of soil and vegetation and increase herbaceous soil cover, promoting long-term maintenance and improvement of watershed conditions on public lands and lands acquired within the ACEC:

- Precluding most mining on public lands.
- Eliminating livestock grazing on public lands.
- Designating a single utility corridor in the planning area.
- Applying vegetation treatments.

Road closures would be extensive, limiting runoff and erosion. Camping restrictions under Alternative 4 would be comparatively relaxed, increasing the potential for soil disturbance and the risk of erosion on more acreage than under the other alternatives except Alternative 1.

More than under Alternatives 1, 2, or 3, these provisions under Alternative 4 would help meet the upland vegetation and riparian objectives on the public lands in the short- and long-term, especially when coupled with the following management actions:

- Treating vegetation to increase grass and limit shrubs.
- Restricting riparian camping.
- Not authorizing sand and gravel sales.
- Coordinating watershed management with other entities.
- Correcting excess erosion in Wood Canyon.

### *Cumulative Impacts--Alternative 4 on Watershed*

By working as part interest in large ranches in the basin and engaging in mutually agreed upon progressive range management, BLM has been able to be involved in and affect the management of BLM, State Trust, and private lands. BLM's approach has led to flexible stocking rates that have been below the permitted rates. Flexible stocking rates tied to forage production, coupled with range improvements (paid for with grazing receipts) to improve the control of livestock distribution and rotational grazing systems, have improved watershed cover and soil conditions on public and nonpublic lands. If the partnership is lost as BLM drops out as a stakeholder in the

management of large ranches, these ranches might be more likely to resume running at the full permitted limit on State Trust and private lands to make up for the economic loss of public land forage.

Livestock management on these nonpublic lands could degrade overall watershed condition and harm BLM-administered lands, including riparian and aquatic habitats along Cienega Creek. On the Empire-Cienega allotment, the number of head would remain nearly the same to maintain economic viability of the ranch, but the area used would decrease by more than 50% once BLM fences off public lands.

Keeping ranches viable would be complicated by the disjointed pattern of state and private lands in the planning area. With ranching viability affected both by market forces and loss of forage from public lands, sale of land in the basin for development would accelerate. The gains on public lands would likely be offset by a substantial decline in watershed conditions from reverting to traditional grazing practices and converting of private ranches and State Trust Land to urban development. Over the long-term, further development in the basin and increased stocking densities at fixed numbers are expected to greatly increase runoff and erosion and decrease soil cover and water infiltration into the soil.

**However, if BLM or another entity applied for and received conservation use on the State Trust lands (which is now a possibility based on a recent court decision), then the cumulative impacts might be different. Improved watershed cover and soil conditions would occur on both BLM and State Trust lands over the long-term. The risk of development of State Trust lands would still exist and, if these lands were developed, the watershed impacts would include greatly increased runoff and erosion and decreased soil cover and water infiltration into the soil.**

**The implementation of the proposed Las Cienegas Acquisition Strategy (Appendix 2) and the existing Land Tenure Plan Amendment to the Safford District RMP will have the same long-term positive impact as described for Alternative 2.**

## *Impacts to Water Quality*

### *Impacts on Water Quality from Alternative 1 (Current Management)*

Although water quality sampling of the past nine years has been limited in the Cienega Creek watershed, all samples have met state water quality standards and support all uses designated in the planning area. Therefore, current management would only negligibly lower water quality.

#### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*
Current watershed and upland and riparian management would not directly, indirectly, or cumulatively lower water quality.

*Fish and Wildlife Management*
Fish and wildlife management under Alternative 1 would generally raise water quality. Even limited actions to improve habitat for special status species would reduce runoff, erosion, sedimentation, and turbidity, improving water quality but not measurably.

*Visual Resource Management (VRM)*
Visual resource management would not affect water quality.

*Cultural Resource Management*
Actions taken to meet cultural resource objectives would only imperceptibly affect water quality. Restoring historic sites might increase visitation and traffic, worsening road conditions, erosion, and, consequently, water

quality. Under Alternative 1 upgrading existing visitor restrooms and water facilities at ranch headquarters would improve water quality because site design would incorporate water quality standards for drinking water, waste disposal, and water treatment for sewage. Water quality testing has been insufficient to determine a baseline, but without updates as part of the headquarters development, water quality at headquarters would continue to decline. Upgrading sanitary facilities at headquarters should also reduce impacts elsewhere from dispersed recreation ~~and the increased use of the Arizona Trail.~~

**From Land Use Allocations**

*Mineral Development*

The ~~458~~ 7,265 acres that would remain open to mineral development under current management would become a potential source of water quality degradation should mining actually occur. Impacts cannot be projected before preparing a mining plan of operations, which would include methods, mitigation, and rehabilitation plans and plans to meet the required conditions established in aquifer protection permits, Section 404 permits, or other permits for protecting water quality.

*Utility Rights-of-Way and Land Use Authorizations*

Without utility corridor designation, rights-of-way could proliferate, increasing disturbed or exposed surface area, runoff, erosion, and sedimentation in Cienega Creek. Revegetation of disturbed areas would be ~~mitigation~~ required on a case-by-case basis. Negative cumulative impacts of the current management approach to right-of-way and other land use authorizations are likely to exceed those of a designated corridor. An acre of disturbed right-of-way in the Cienega Creek watershed could produce 2 to 3 tons of displaced soil per year. Any action that results in an open-ended increase of disturbed area would have an increasing cumulative effect.

*Off-Highway Vehicle Management*

Under current management, use of unpaved roads is a significant source of turbidity and sedimentation in streams such as Cienega Creek, which receives runoff from the entire planning area. Without any road closures, the continued and probably increasing use of the existing ~~136.4~~ 134.7 miles of roads in the area would continue to lower water quality in Cienega Creek. Although cumulative increases in runoff and sedimentation would be mitigated by the restriction of OHV use to existing roads, increased use of the existing roads and, therefore, an increasing cumulative impact would be expected. Mitigation through increased road and ditch maintenance would be needed.

*Recreation Management and the Arizona Trail*

It is difficult to compare current management with its dispersed recreation use to alternatives that concentrate use. The impact of a single use of an existing trail, or camping area, is likely to be similar anywhere it occurs under comparable conditions. But the overall and cumulative negative impacts in runoff, sedimentation, and bacterial contamination of surface water from dispersed, unrestricted recreation as under current management could be greater than that of concentrated use. Previously undisturbed areas would more likely be disturbed. Erosion on a new, unmaintained trail would probably be greater than on an established, maintained trail. Limiting use in more erodible areas or areas closer to surface water would be more difficult under current management than under the other alternatives.

The current mix of dispersed and concentrated recreation only slightly lowers water quality. But as use increases under current management,

the impacts on water quality from Alternative 1 are likely to increase at a greater rate than that of the other alternatives. Dumping of waste materials now degrades water quality in Empire Gulch.

*Livestock Grazing*
The current management of grazing would affect water quality much as it would affect watershed, riparian, and aquatic resources.

***Empire-Cienega Allotment***
Current management and variable stocking rates, depending on conditions in the Empire-Cienega allotment, have moderately improved water quality. Riparian vegetation has been sustained or improved in condition. Exclosures have provided a high level of protection. And short-term, high intensity use of suitable pastures with annual rest has maintained vegetation cover. Maintaining or improving the condition of riparian and upland pasture vegetation is arguably the most important factor in improving water quality.

On the other hand, the continued use of six existing Cienega Creek livestock crossing lanes would temporarily increase turbidity and coliform bacteria. Livestock crossing the creek might increase sedimentation by trampling banks and disturbing streamside vegetation.

***Vera-Earl, Rose Tree, and Empirita Allotments***
The fixed stocking rates in these allotments are conservative. With adequate rest, impacts on water quality would be short-term, and cumulative impacts would be negligible. But not resting areas as planned, perhaps because of drought, could significantly reduce cover and result in runoff, turbidity, sedimentation, and bacterial pollution. Without later adjustments in stocking rates, cumulative harm to water quality would also result.

Not allocating all acres on the Empirita allotment to grazing and not allocating the Empire Mountains to grazing would cumulatively improve water quality in those subwatersheds of Cienega Creek and in Cienega Creek itself as vegetation cover increases.

**From Special Designations**

*Areas of Critical Environmental Concern*
No impacts from current management are expected.

## *Impacts on Water Quality from Alternative 2*

**From Desired Resource Conditions**

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*
Vegetation treatments planned for the Empire-Cienega and Empirita allotments are likely to increase surface erosion in the short-term during a period of reduced cover on 20,000 acres identified for treatment through the ecological site inventories. **Additional acreage identified for treatment as a result of monitoring, if treated, would have similar impacts.** If treatments are successful, cover should increase after the first rainy season following treatment. Increased vegetation cover would reduce runoff, erosion, and sedimentation of drainages. Changes in other allotments cannot be predicted since further evaluation will be needed before BLM prescribes any treatments.

The following proposed actions would all immediately and cumulatively raise water quality by reducing sediment entering streams:

- Repairing damaged stream banks.
- Minimizing construction in the 100-year floodplain.
- Prohibiting camping in riparian areas.

- Limiting stream crossings **by vehicles and livestock.**

- Restricting recreational mining in Cienega Creek.

In many areas, runoff from roads degrades water quality much more than any other agent and causes as much as 90% of degradation on steep slopes. Implementing design changes to halt excess erosion on roads would significantly improve water quality in Cienega Creek and its tributaries to an unknown extent.

*Fish and Wildlife Management*
Fish and wildlife management under Alternative 2 would generally improve water quality. Actions to improve habitat through overall watershed condition improvement would reduce runoff, erosion, sedimentation, and turbidity helping improve water quality.

Actions proposed to reestablish species are likely to have imperceptible or positive impacts on surface water quality. Generally, riparian and aquatic habitat improvement through periodic rest from grazing and vegetation treatments reduces sedimentation and turbidity in surface waters, improving water quality. Also, likely to improve water quality would be actions to improve pronghorn ~~antelope~~ habitat such as low-use primitive camping, limited road use, and acquisition of land and conservation easements.

*Visual Resource Management (VRM)*
Designating visual resource management Class II under Alternative 2 would not affect water quality.

*Cultural Resource Management*
Actions taken to meet cultural resource objectives under Alternative 2 would imperceptibly affect water quality although restoring historic sites might increase visitation and traffic with associated negative impacts on road condition, erosion, and water quality.

Actions in support of cultural resource objectives would negligibly affect water quality. Monitoring and protecting areas subject to soil erosion and other disturbances that would damage cultural sites are also likely to slightly benefit water quality, depending on site locations.

Managing the Empire Ranch headquarters under Alternative 2 would have the same effects as under Alternative 1, except that adaptive reuse of buildings may attract greater numbers of visitors. Alternative 2 would further develop visitor restrooms and water facilities as visitation increases. Developing sanitary facilities at ranch headquarters would somewhat reduce water quality impacts in other recreation zones and impacts on water quality from increased use of the Arizona Trail.

**From Land Use Allocations**

*Mineral Development*
Under Alternative 2, continued closure of most of the public lands to new mining would significantly lower the risk of future water quality degradation from heavy metal contamination that could reach Cienega Creek in runoff. Successful petitions to withdraw land now open to mining would further lower the risk. But these changes would have no immediate measurable impact, positive or negative, because water quality data show no effect from current mineral management.

*Utility Rights-of-Way and Land Use Authorizations*
Alternative 2 would limit impacts to water quality from utility rights-of-way to those now occurring. Any new rights-of-way, if granted, would disturb more surface in the two designated right-of-way corridors.

The degree of impact in increased sediment transport and turbidity is difficult to estimate. Rights-of-way granted on the current pipeline route would increase sedimentation in all tributaries on the west side of Cienega Creek for its entire course in the planning area. Rights-of-way granted on the current power line right-of-way would increase surface disturbance and sedimentation in tributaries on the east side of the northern half of the planning area, especially Mattie Canyon. The impact would diminish as the right-of-way moves farther from Cienega Creek in the south half of the planning area. In either case, Alternative 2 would exclude new disturbance on previously undisturbed land, which would benefit water quality. Seeding, water bars, sediment catchments, and other routine methods of erosion control would significantly mitigate impacts from new surface disturbance.

*Off-Highway Vehicle Management*

Designating roads for OHV use would reduce the number of roads on which vehicles would travel. Less motorized travel on roads near drainages would reduce the risk of increased sedimentation, turbidity, and accidental spills of petroleum products in Cienega Creek and its tributaries. But road designation poses the long-term risk of degrading water quality should OHV use and related damage increase to a level that offsets the benefits of designated roads. At that point, when runoff from roads threatens to increase sediment, turbidity, or petroleum-related contamination in Cienega Creek, BLM might need to further restrict access. Such impacts cannot be measured because total traffic would increase to unknown levels as use of the planning area increases over time.

*Access and Transportation*

Limiting access to Oak Tree Canyon and its erodible soils would reduce some sedimentation in nearby drainages. A policy of responding to resource damage caused by transportation should have beneficial cumulative impacts.

*Recreation Management*

Recreation zone management under Alternative 2 would affect water quality much as it would affect watershed and riparian areas. These impacts are difficult to project, particularly the cumulative impacts, because they are likely to increase over time at an unknown rate. Even the immediate impacts of concentrating certain types of recreation, groups over 30, car camping, or parking at designated trailhead sites are difficult to assess. Much of that activity is already occurring on those sites. Further concentration of the activity is likely to add slightly to the existing low level of disturbance, with some small increase in runoff and turbidity. These are not likely to be measurable increases.

Reduced ground cover from the group areas at Maternity Well, the Air Strip, and Agricultural Fields is likely to increase sedimentation in streams tributary to Cienega Creek and Empire Gulch. The same affects are likely at the designated camp areas at Oak Tree, Cieneguita, Oil Well, and Road Canyon. Use monitoring and periodically resting these sites could partially mitigate this sedimentation, as could covering the ground with gravel or other materials.

The closeness of heavy use areas to Cienega Creek or its main tributaries increases the risk at Oak Tree and the Agricultural Fields, although it might be some time before heavy use develops at the Agricultural Fields. Silty, erodible soils at Oak Tree further increase the risks of water quality degradation as use grows in that area.

Enforcing the day use restriction at Empire Gulch might reduce the dumping of waste material, particularly organic contaminants, that

,

threaten water quality with fecal coliform. BLM has not yet detected violations of water quality standards.

Even where BLM has installed sanitary facilities, the risk of human waste degrading water quality would increase in concentrated use areas and in dispersed hiking and camping areas particularly near Cienega Creek, Empire Gulch, and main tributaries. As use increases, BLM might need to mitigate this problem by patrolling and cleaning up high-use areas.

This assessment assumes that the following management practices and mitigation are also implemented:

- The Leave No Trace program eliminates human waste from designated recreational areas without sanitary facilities.
- BLM educates visitors and enforces the rules on vehicle use and other destructive visitor behavior.
- When damage occurs, it is promptly repaired.

The proposed multi-level maintenance plan is expected to provide the mitigation and facility maintenance to protect or improve water quality.

*Arizona Trail*

Under Alternative 2, most of the Arizona Trail would have to be newly built, causing some transitory increase in sedimentation in Cienega Creek, especially where the trail runs close to the creek. Water quality could also be at risk if runoff in Oak Tree Canyon carries sediment into Cienega Creek.

Predicting levels of future use is difficult. But if use increases significantly, risk of fecal coliform contamination in Cienega Creek would also increase. But degrading of water quality is expected to be negligible and avoidable with simple mitigation. Adequate toilet facilities and routine trail maintenance would assure that Cienega Creek would continue to meet water quality standards.

*Livestock Grazing*

Under Alternative 2, livestock grazing would affect water quality much as it would watershed. RMP (Resource Management Plan) level planning would slightly reduce acres being grazed in the planning area. A small increase in cover and decrease in runoff, sedimentation, and possibly fecal coliform contamination might result. In Cienega Creek, current levels of turbidity and fecal coliform--the two contaminants attributed to livestock grazing--meet state water quality standards. Therefore, water quality would only slightly improve. Variable stocking rates being used on more of the allotments should respond better to conditions than fixed stocking rates, assuring more cover during drought and improving water quality over time.

***Empire- Cienega Allotment***

Excluding **about** 2,319 acres from grazing under Alternative 2 might over time reduce runoff and sedimentation in drainages affected by this allotment. The current management strategy would continue on this allotment, not significantly changing water quality.

The use of ~~six~~ **five** existing ~~and two proposed~~ livestock crossing lanes on Cienega Creek and **one on Empire Gulch** would continue to temporarily increase turbidity and coliform bacteria. Livestock crossing the creek ~~might~~ **will** increase sedimentation by trampling banks and disturbing streamside vegetation. **Proposed hardening of lanes, that show erosion or are becoming so boggy that they impede crossing by livestock, with addition of rock in the stream bed and on a portion of the banks, would decrease these impacts**.

***Empirita Allotment***
Although the RMP-level planning under Alternative 2 would allow 300 more acres to be grazed on the Empirita allotment than under Alternative 1, changes in management strategy proposed in the ~~activity plan~~ livestock management actions would probably offset any small decrease in water quality. Plans to use a variable stocking rate should result in more cover and less watershed damage during dry periods. Overall, no measurable change in water quality is expected under Alternative 2.

***Rose Tree Allotment***
A 10% reduction in acres being grazed and the implementing of a variable stocking rate might slightly improve water quality. But water quality in the watershed now meets state standards for turbidity and fecal coliform.

***Vera Earl Allotment***
A reduction of nearly 15% in acres being grazed and the implementing of a variable stocking rate might slightly improve water quality, although water quality in the watershed now meets state standards for turbidity and fecal coliform.

***Empire Mountains Allotment***
Livestock grazing in a new 400-acre allotment might increase runoff and sediment and turbidity in the area's drainages. The management plan prepared for this allotment should respond to this possibility with a flexible schedule and stocking rate to protect ground cover, controlling erosion and any threat to water quality from runoff.

The cumulative impacts of livestock grazing management under Alternative 2 are likely to consist of a small reduction of turbidity and fecal coliform in Cienega Creek over time. This improvement in water quality might not be measurable. During dry periods, there is little or no runoff into the creek from the grazing allotments. Current low-flow water quality is good and likely to remain good. During wet periods when runoff flows, natural levels of turbidity are so high that they would obscure changes due to management under Alternative 2.

**From Special Designations**

*Areas of Critical Environmental Concern*
Designating all public lands in the planning area as an ACEC under Alternative 2 would not lower water quality. Other limitations, such as prohibiting new mining, would reduce the risk of contaminated runoff and could improve water quality. Prohibiting recreational gold panning in waters of the planning area under ~~implementation plans~~ management actions for Alternatives 2, 3, and 4 would significantly reduce the risk of violating turbidity standards. Water quality would improve the most under Alternatives 2 and 4, which would designate the largest ACEC. But the improvement would also apply to Alternative 3, whose ACECs would include all perennial waters, the most likely areas where people would pan for gold.

## *Impacts on Water Quality from Alternative 3*

**From Desired Resource Conditions**

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 3 would be the same as under Alternative 2.

**From Land Use Allocations**

*Mineral Development*
Mineral development under Alternative 3 would lower water quality in the same manner as under Alternative 1. But Alternative 3 would open to mineral development a potentially larger area of public lands outside designated ACECs. Opening areas to mineral extraction would increase the risk of future water quality degradation near perennial water or during high runoff. Nevertheless, implementing Alternative

3 itself would not measurably lower water quality.

*Utility Rights-of-Way and Land Use Authorizations*
Impacts under Alternative 3 would not measurably differ from those under Alternative 2.

*Off-Highway Vehicle Management*
Impacts of OHV management on water quality under Alternative 3 would be the same as under Alternative 2.

*Recreation Management*
Recreation management under Alternative 3 would directly, indirectly, and cumulatively affect water quality much as it would under Alternative 2. A much larger area in Zone 2 under Alternative 3 could slightly increase concentrated use, increasing runoff and the risk of degrading water quality. Alternative 3 would designate two more group sites, one more camp area and day use area, and three more pullout areas. But more measurable runoff into Cienega Creek or its tributaries with sediment, bacteria, or other contaminants from these sites is unlikely until overall use in the planning area greatly increases. As in the assessment of impacts under Alternative 2, this assessment assumes that BLM will install and maintain sanitary and other facilities and enforce the use rules.

*Arizona Trail*
The risks of impacts on water quality from the Arizona Trail under Alternative 3 would be comparable to those of Alternative 2. Levels of use are unlikely to differ. Although the length of the trail in the planning area would be 2.5 miles greater, one mile would be on existing road.

*Livestock Grazing*
At the RMP level, the impacts from Alternative 3 would be the same for the Empire-Cienega, Rose Tree, and Vera Earl allotments as under current management. Impacts on the Empirita and Empire Mountains allotments would increase as the result of an increased area of the allotments being open to grazing. The grazed area of public lands on the Empirita allotment would increase about three-fold, and the Empire Mountains, ungrazed under current management, would come entirely under grazing management. Many areas of shallow soils and steep slopes could significantly increase the risk of erosion and limit the opportunity for recovery. Intense storms with high volumes of runoff are common during the summer wet season and are likely to carry sediment directly to Cienega Creek.

~~At the activity plan level,~~ The fixed stocking rate under Alternative 3 would degrade water quality on the Empire-Cienega allotment more than under current management. During unfavorable conditions such as drought, Alternative 3's less flexible management could cause overgrazing and insufficient cover to protect the surface. The result could be sedimentation, increased turbidity, and the exceeding of water quality standards for fecal coliform.

The use of ~~six~~ **five** existing ~~and two proposed~~ livestock crossing lanes on Cienega Creek and **one crossing lane on Empire Gulch** would continue to temporarily increase turbidity and coliform bacteria. Livestock crossing the creek ~~might~~ **will** increase sedimentation by trampling banks and disturbing streamside vegetation. **Proposed hardening of lanes that show erosion or are becoming so boggy as to impede crossing, by addition of rock in the stream bed and on a portion of the banks, would decrease these impacts**.

The ~~activity-level~~ grazing management for the Rose Tree, Vera Earl, and Empirita allotments would not significantly differ. Stocking rates would be slightly lower, and vegetation inventories would be updated on the Vera Earl and Rose Tree allotments. But these actions would be unlikely to affect water quality. Livestock would graze the Empire Mountains at a relatively low, fixed stocking rate, which under unfavorable conditions could degrade ground cover. At later dates, runoff into Cienega Creek could lower water quality.

### From Special Designations

*Areas of Critical Environmental Concern*
ACECs designated under Alternative 3 would improve water quality much as those designated under Alternative 2. The benefits cannot be measured but would be less than under Alternative 2, whose area in ACECs would be ten times greater than that under Alternative 3.

## *Impacts on Water Quality from Alternative 4*

#### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

#### From Land Use Allocations

*Mineral Development*
Alternative 4 would benefit water quality the same as would Alternative 2.

*Utility Rights-of-Way and Land Use Authorizations*
Construction in rights-of-way under Alternative 4 would cause the same disturbance as under Alternative 2 for the existing power line right-of-way on the planning area's east side. Eliminating new disturbance on the pipeline right-of-way would reduce the risk of increased sedimentation and turbidity in water reaching Cienega Creek from tributaries on the planning area's west side. Eliminating new surface disturbance from construction in rights-of-way anywhere else in the planning area would benefit water quality in the same manner as under Alternative 2.

*Off-Highway Vehicle Management*
Impacts would be the same as under Alternative 2.

*Recreation Management*
Impacts to water quality from recreation under Alternative 4 would be the same as under Alternative 2. A slightly smaller area in Zone 2 management could reduce impacts of concentrated use and associated runoff and increases in turbidity or bacterial contamination in Cienega Creek. Changes are not likely to be measurable.

*Arizona Trail*
Use of the Arizona Trail under Alternative 4 should not degrade water quality as long as Leave No Trace education is effective.

*Livestock Grazing*
Without livestock grazing under Alternative 4, upland cover is likely to increase. Livestock could no longer disturb riparian areas and stream banks. Infiltration of more precipitation and increased density of vegetation in the riparian areas would be likely to improve water quality. Sediment, turbidity, and fecal coliform in perennial water would decline. But water quality would only modestly improve because upland condition is good and water quality is now meeting state standards under current management.

Cessation of grazing within riparian areas would slightly improve the condition of woody and herbaceous vegetation and further increase bank stability. But improvements would only be

slight because livestock do not graze most of the riparian areas under current management except for crossing lanes and a small winter use area representing about 2.7% and 8.6% of the total riparian area, respectively. Any riparian areas not in proper functioning condition have resulted from forces other than grazing. Slight improvements in bank stability and upland condition would reduce sedimentation and turbidity in tributary drainages.

### From Special Designations

*Areas of Critical Environmental Concern*
Designating ACECs under Alternative 4 would benefit water quality in the same manner as under Alternative 2.

## BIOLOGICAL RESOURCES AND PROCESSES

### Impacts to Upland Vegetation

**Scope of Analysis:** This section uses changes in upland vegetation condition and ability to meet the upland vegetation objective to compare impacts of the alternatives on upland vegetation.

### *Impacts to Upland Vegetation from Alternative 1 (Current Management)*

#### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*
Without an integrated vegetation treatment strategy, Alternative 1 would allow mesquite and burroweed to continue to invade grassland sites as a long-term trend. This invasion would decrease herbaceous vegetation cover on the soil surface and increase deeper rooted woody perennials. If the trend continues, ecological conditions would fail to meet the Arizona Standards for Rangeland Health.

*Fish and Wildlife and Cultural Resource Management*
Fish and wildlife and cultural resource management under Alternative 1 would not affect upland vegetation.

*Visual Resource Management (VRM)*
Implementing visual resource management Class III could constrain vegetation treatments and range improvements.

#### From Land Use Allocations

*Mineral Development*
Under current mineral management, mining could directly disturb upland vegetation on ~~6,373~~ 7,265 acres of public and split-estate lands. Moreover, haul roads, material storage sites,
and associated facilities and activities would disturb more upland vegetation. These impacts include the following:

- Destroying and removing vegetation.
- Changing plant communities or conditions.
- Introducing exotics plants.
- Promoting weed invasions.

Both short- and long-term impacts could result, depending on the size, type, and duration of the mine. Impacts would be mitigated to the extent possible through BLM mining regulations and the National Environmental Policy Act (NEPA) process.

*Utility Rights-of-Way and Land Use Authorizations*
Many of the land uses authorized under current management (e.g., rights-of-way for access, utilities, vegetation products, and apiaries) require vehicle access roads or work areas that would disturb upland vegetation. The size and nature of the impacts would depend on the

actions proposed. BLM develops and incorporates into use authorizations the mitigation for protecting and rehabilitating upland vegetation.

*Off-Highway Vehicle Management*
Under current off-highway vehicle management, BLM has not fully implemented a designated route system. When vehicles are driven off existing roads and new roads are created, it is difficult to prove that there previously was no road. These "wildcat" roads then become part of the existing road system which keeps expanding. Each new road disturbs more upland vegetation.

*Road Designations*
The intermixed land ownership pattern also creates problems. Under current management, BLM can regulate use and maintenance of only portions of the planning area's road network on BLM-administered lands. This restriction creates great difficulty in implementing changes in the overall road network and in enforcing regulations that could protect upland vegetation. Protecting vegetation and soils in sensitive areas subject to erosion is difficult, if entities share the road ownership. Problems are recognized on a case-by-case basis and the big picture is often missed.

*Recreation Management*
Under current management, recreation use has steadily increased on the Empire Ranch since BLM acquired the property. Increased visitation has resulted in increases in campsites, parking areas, turnouts, and trails which have increased vegetation disturbance. Besides trampling more vegetation, expanded recreation has increased unplanned fire starts from vehicles, campfires, cigarettes, and arson. These unplanned fires can harm all resources and remove all vegetation on large portions of the watershed. Unplanned fires can burn when plants are sensitive to damage or in areas susceptible to erosion.

*Arizona Trail*
Alternative 1 would not designate a corridor for the Arizona Trail and the trail would, therefore, not affect upland vegetation.

*Livestock Grazing*
Under Alternative 1, existing livestock operations would continue at current levels on the public lands as shown in Table 2-6. Livestock would graze a total of 41,855 acres of upland vegetation. On BLM-administered public lands, livestock grazing operations must be able to achieve the Arizona Standards for Rangeland Health and the objectives developed in the interim grazing plans (See Appendix 2). Existing grazing plans have no site-specific interdisciplinary resource objectives for vegetation or wildlife.

Livestock grazing must be able to achieve healthy upland, riparian, and threatened and endangered habitat standards. Under current management, mesquite and burroweed are increasing and perennial grasses are decreasing due to changes in seasonal precipitation, fire suppression, and livestock grazing. Although overall vegetation conditions are improving under current livestock management, mesquite and brush, which are invading in response to past livestock use and fire suppression, might need to be removed through vegetation treatment. Apparent shifts from summer to winter rainfall patterns might also require shrub and tree removal to maintain desired vegetation conditions.

***Empire-Cienega Ranch Allotment***
Under current management, intensive, short-term grazing, coupled with annual rest of pastures and flexible stocking rates, is improving vegetation conditions on the watershed. The current grazing strategy seeks to improve plant vigor and herbage production and slowly change the species composition to more desirable perennial grasses (Martin 1978). The time needed and the amount of change expected

would vary from site to site in the planning area, depending on the site potential of the particular range site (soil type and rainfall zone).

BLM and the livestock operator developed the current livestock grazing strategy with the seasonal growth habits of the key forage species in mind. The rest periods during the spring and summer growing season were designed to physiologically benefit both cool- and warm-season perennial grasses. Continuing this rest through the winter allows the complete phenological development of the grasses before another grazing cycle begins.

Grasses are adapted to grazing pressure because growth originates at the basal meristem, close to the soil surface. Aerial portions are not essential to plant survival and might be regenerated quickly if the root crown is not damaged and if enough photosynthesis has taken place to provide for root development and annual replacement. In fact, moderate grazing might stimulate plant growth because removing plant material with carbohydrate reserves might increase photosynthesis to replace the lost material (Humphrey 1958). Enough residual plant material must be left for soil cover, and the grass' energy reserves must not be depleted through repeated grazing during the growing season.

Fence building would not significantly disturb vegetation. Fence lines would not be bladed, and as little brush as possible would be cut. The impacts would be negligible and short-term.

#### *Empirita, Rose Tree, and Vera Earl Allotments*

The current stocking rate, combined with annual rest of pastures, should improve upland vegetation conditions. Grazing would be adjusted, if needed, to achieve the Arizona Standards for Rangeland Health.

Impacts from creating any needed range improvements would be similar to those described for the Empire-Cienega allotment. On the Empirita allotment, building the Gary pipeline to replace the creek as a water source would disturb vegetation along the existing roadway for a short period. Future environmental analyses for specific proposals would analyze the nature and degree of impacts from these activities.

#### From Special Designations

*Areas of Critical Environmental Concern*

Since Alternative 1 would designate no areas of critical environmental concern (ACECs), no special management of upland vegetation would result.

### *Impacts to Upland Vegetation from Alternative 2*

#### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*

Under Alternative 2, upland vegetation management through integrated vegetation treatment would reverse the long-term degradation from grazing and fire suppression that facilitated shrub invasion of grassland ecological sites. BLM would apply prescribed fire, tree and shrub cutting, and herbicide treatments where plant communities have shifted away from dominance by perennial grasses. BLM would also design and implement vegetation treatments to achieve the upland vegetation objective. These treatments would mainly consist of prescribed fire, brush cutting, and the use of herbicides to control mesquite and burroweed. Prescribed fire and herbicides would improve vegetation condition by reducing and slowing the spread of the shrubs in favor of perennial grasses. These treatments would convert 20,000 acres of grassland invaded by mesquite and burroweed to a visual aspect of

open grassland, **and would maintain grasslands and desired vegetation conditions in other areas**. ~~Requiring permits~~ **Establishing guidelines including weight limits** for collecting and harvesting vegetation products and plants in the planning area would help prevent unnecessary disturbance to upland vegetation by over collecting.

*Fish and Wildlife Management*
To guide upland vegetation management, BLM must do the following:

- Develop key habitat elements and conditions for the health of special status species.
- Determine desired future vegetation conditions and mosaics of wildlife habitat.
- Resolve conflicting uses.
- Modify vegetation objectives and wildlife sub-objectives to reflect the new information.

These tasks would require an increased commitment to monitoring resources and coordinating with other resource users and specialists. BLM would also need research to determine cause-and-effect relationships. In the Empire-Cienega allotment the biological planning process has served this function well. The pronghorn and sparrow cover objectives in this planning effort directly resulted from the biological planning process.

*Visual Resource Management (VRM)*
Implementing visual resource management (VRM) Class II could more restrict vegetation treatments and range improvements than managing for VRM Class III under current management, which is slightly less restrictive.

*Cultural Resource Management*
BLM would need to evaluate cultural resources for all surface-disturbing activities, including vegetation treatments. BLM might also need to develop mitigation to protect cultural resources. Both of these requirements increase the cost of vegetation treatment programs and, therefore, the cost of achieving desired upland vegetation conditions.

Developing the Empire Ranch headquarters would require stripping some vegetation for parking or access, but would result in only slight impacts. Onsite and offsite interpretative and educational programs could help the public understand the grassland ecosystem and how vegetation treatments help sustain that resource.

**From Land Use Allocations**

*Mineral Development*
Under Alternative 2, restrictions on mineral development of acquired public lands and the withdrawal of another ~~6,373~~ 7,265 acres of land now open to mineral development would prevent short- and long-term impacts to upland vegetation. Stable vegetation communities would not be at risk from the potential harm of small- or large-scale mining over the short- or long-term. The scope of the impacts would depend on the potential for mitigation and the scale, location, and type of mine.

~~The activity plans for~~ Alternatives 2, 3, and 4 would authorize the administrative ~~and casual~~ use of a limited amount of sand, gravel, boulders, and clay. The vegetation disturbed by the administrative ~~and casual use~~ of these materials would cause localized short-term harm to upland vegetation at the material sites. BLM would incorporate mitigation into the authorization to ensure that as little vegetation as possible is disturbed and to require that the site be rehabilitated after operations cease. Any revegetation would require the use of native plants.

*Utility Rights-of-Way and Land Use Authorizations*

Under Alternative 2, more utility development within the two designated utility corridors where lines already exist could potentially disturb upland vegetation. Service roads could disturb more upland vegetation. Vegetation could be disturbed in both the short- and long-term along the route. BLM would use the National Environmental Policy Act (NEPA) to design measures to mitigate long-term adverse impacts.

*Off-Highway Vehicle Management*

Alternatives 2, 3, and 4 would restrict vehicle use to designated roads and implement the designated transportation, eliminating the current confusion with wildcat roads. With fewer wildcat roads being created, visitors would disturb less upland vegetation.

*Road Designations*

Alternative 2 would retire and rehabilitate ~~16~~ 13.7 miles or ~~23.2~~ 20 acres (~~12~~ 10%) of the planning area's ~~199~~ 196-acre road system. Bare ground would slightly decrease and vegetation would slightly increase.

*Recreation Management*

Alternative 2 would establish limits and zones for managing recreational use, growth, and development. The level of impact from recreation on upland vegetation is difficult to estimate. Recreation zones would limit camping-related soil and vegetation disturbance on 4,613 acres. Sites used for group camping or staging areas would be graveled or revegetated to protect watershed integrity. Although reducing the amount of upland vegetation, graveling would protect high-use areas and prevent erosion and soil loss from these sites.

The remaining 44,387 acres of public land would continue to be open to dispersed recreation, including camping, hiking, and hunting. These activities would slightly disturb vegetation. BLM would require group events to have permits with stipulations that would mitigate impacts. Only a few designated group sites would cause watershed damage and these sites would be small. The level of impacts from recreation under Alternative 2 would be somewhat lower than under Alternative 1. Establishing a recreation permit system would allow BLM to adjust recreation levels to ensure that upland objectives continue to be met. Depending on the level of use, recreation under Alternative 2 would slightly to moderately harm upland vegetation.

*Arizona Trail*

Trail building under Alternative 2 would disturb about four acres of upland vegetation. But associated camping and wildcat spur trails would disturb more land. Overall, Arizona Trail development under Alternative 2 would disturb slightly more upland vegetation than would Alternative 1, which would not develop the trail.

*Livestock Grazing*

Livestock would graze a total of 42,155 acres of upland vegetation under Alternative 2. Livestock grazing management under Alternative 2 would benefit watershed condition and function more than under Alternative 1 as described in the above impacts to watershed section. Under Alternative 2, BLM-administered public lands would need to meet the Arizona Standards for Rangeland Health as detailed for Alternative 1. To make these standards more site specific, the planning team has developed resource objectives that further define BLM's understanding of what healthy conditions would be in the planning area. When implemented, Alternative 2 management would meet these objectives.

BLM would set up more vegetation study exclosures under Alternative 2 (**about** 2,319 acres versus **about** 659 acres under Alternative 1 on the Empire-Cienega allotment) and use them to compare the success of livestock and vegetation treatments in achieving vegetation

objectives and healthy watershed conditions. In response to the data collected and assessed, BLM would adjust livestock grazing strategies, and improved upland vegetation management would result.

Creating a new grazing allotment under Alternative 2 in the Empire Mountains would disturb vegetation much as current livestock grazing does on other public lands. But developing and implementing a livestock grazing operation that includes State Trust and private lands would consolidate land controlled by the grazing lessees, easing the area's overall management. Practices to improve watershed condition (such as prescribed burning), endangered species management, and protection of open space would be much easier to accomplish where all land owners have agreed to the vegetation objectives and ownership does not appear to be as "fractured" as it actually is.

#### From Special Designations

*Areas of Critical Environmental Concern*
ACEC designation would emphasize protecting more lands by acquisition, conservation easements, or partnerships and would allow BLM to coordinate desired future vegetation condition over a larger proportion of the planning area. This designation would also help direct more resources to achieve the upland vegetation objective.

## *Impacts to Upland Vegetation from Alternative 3*

#### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 3 would be the same as under Alternative 2.

#### From Land Use Allocations

*Mineral Development*
Under Alternative 3, mineral development would affect upland vegetation as it would under Alternative 1 except that the impacts could occur over a much larger area.

*Utility Rights-of-Way and Land Use Authorizations*
Under Alternative 3, utility rights-of-way and land use authorizations would affect upland vegetation as under Alternative 2. But the impacts could be greater due to the added right-of-way and associated service roads.

*Off-Highway Vehicle Management*
Impacts under Alternative 3 would be the same as under Alternative 2.

*Road Designations*
Alternative 3 would close ~~17.8~~ 14.2 acres of road, mostly in sensitive areas along Cienega Creek. Allowing only one road crossing **across the perennial section of Cienega Creek** and rehabilitating the others would reduce erosion. Watershed function and upland vegetation condition would improve slightly more than under Alternative 1.

*Recreation Management*
Under Alternative 3, the level of impact from recreation on the watershed and on upland vegetation would be less than under Alternatives 1 or 2, because more area would be restricted to designated sites as described in the above impacts to watershed section. Establishing a recreation permit system would allow BLM to adjust recreation levels to ensure that upland objectives continue to be met. As under Alternative 2, adverse affects of recreation on vegetation would be slight to moderate, depending on the level of use.

*Arizona Trail*
The Arizona Trail under Alternative 3 would affect upland vegetation the same as under Alternative 2.

*Livestock Grazing*
Livestock would graze ~~43,895~~ 45,375 acres of upland vegetation under Alternative 3. For most years, management on the five allotments would meet the upland vegetation objects as a result of the following:

- Conservative fixed stocking rates.
- Scheduled pasture rotations.
- Annual and seasonal rest of pastures.
- Vegetation treatments such as prescribed fire.

During extended drought the risk of overstocking and overgrazing would increase because livestock management could not change as fast as field conditions might require. Thus, this grazing strategy might degrade vegetation and the watershed if plants lose vigor because of persistent low soil moisture and continued grazing at fixed levels.

Impacts from livestock waters and other improvements under Alternative 3 would be the same as under Alternative 1. This type of grazing management could result in long-term harm to vegetation and watershed condition more than under Alternatives 1 or 2.

**From Special Designations**

*Areas of Critical Environmental Concern*
Alternative 3 would affect upland vegetation much as would Alternative 1, except that Alternative 3 would reduce the scope of protection by about 90% to cover 4,859 instead of 45,859 acres. Moreover, opportunities for land acquisition based on ACEC designation would be more limited under Alternative 3.

## *Impacts to Upland Vegetation from Alternative 4*

**From Desired Resource Conditions**

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

**From Land Use Allocations**

*Mineral Development*
Mineral development under Alternative 4 would affect upland vegetation the same as it would under Alternative 2.

*Utility Rights-of-Way and Land Use Authorizations*
Impacts on upland vegetation under Alternative 4 would be similar to those described for Alternative 2, but would be less harmful because Alternative 4 would limit impacts to one corridor.

*Off-Highway Vehicle Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

*Road Designations*
Under Alternative 4, BLM would close and rehabilitate ~~27.6~~ 25.5 miles of roads or about ~~40~~ 37 acres, including sensitive areas along Cienega Creek. Only one road crossing would remain open across a perennial portion of Cienega Creek. The rest would be rehabilitated to reduce erosion. The ~~29.6~~ 31.1 miles of restricted use roads would help prevent wildcat roads in sensitive areas in the watershed and would reduce disturbance of upland vegetation. Adverse impacts under Alternative 4 would be slightly less than under Alternative 1.

*Recreation Management*
The level of impact from recreation under Alternative 4 would affect vegetation less than would recreation under Alternative 1. Alternative 4 would set up recreation zones that would limit camping-related vegetation disturbance on 3,270 acres and would periodically revegetate the group camping site. The remaining 45,730 acres of public land in the planning area would remain open to dispersed recreation, including camping, hiking, and hunting. At first, dispersed recreation would disturb only a small amount of vegetation. But the impacts would increase with recreation use over time. As under Alternative 2, establishing a recreation permit system would allow BLM to adjust recreation to ensure that upland vegetation continues to meet its objectives.Depending on the level of use, recreation under Alternative 4 would slightly to moderately harm upland vegetation.

*Arizona Trail*
Placing the Arizona Trail along existing roads would eliminate any more disturbance of upland vegetation from trail construction. Some wildcat spur trails would negligibly disturb upland vegetation next to the trail. Consequently, the Arizona Trail under Alternative 4 would affect upland vegetation conditions much as it would under Alternative 1, which proposes no trail.

*Livestock Grazing*
Under Alternative 4, BLM would not authorize livestock grazing on any public lands it administers in the planning area. BLM would take 41,855 acres out of livestock production within the four existing allotments. Livestock would no longer consume upland vegetation on these acres, but the following residual effects of grazing would remain at least in the short-term:

- Changes in species composition.

- Increases in invasive species.



- Increases in certain exotic species.

The upland objective would be achieved by applying vegetation treatments and **exotic/invasive species control measures**.

**There are several scenarios which could occur, relating to the State grazing leases held by BLM, with differing impacts**. These impacts would be similar to those described under Alternative 4: livestock grazing impacts to watershed.

**From Special Designations**

*Areas of Critical Environmental Concern*
ACEC management under Alternative 4 would affect upland vegetation the same as under Alternative 2.

## Impacts to Noxious Weeds and Invasive Species

**Scope of Analysis:** This section uses the risk of invasion or spread of noxious weeds **and invasive species** to assess the impacts of the alternatives.

### *Impacts to Noxious Weeds from All Alternatives*

Under all alternatives a variety of human uses of the Empire-Cienega Planning Area could introduce noxious weeds **and introduce or spread invasive species**. Livestock and recreational use would be sources of noxious weeds **and invasive species and can also contribute to the spread of these species**. Although the current livestock operators do not use supplemental feed for cattle, feed for horses used in livestock operations might not be weed free. As visitors increase, so does the probability of surface disturbance. Such disturbance would increase the likelihood of noxious weeds being introduced to the area.

Revegetating with native plants following disturbances such as fire, utility line construction, or recreation developments would minimize the spread or introduction of exotic or invasive species from project development.

Under Alternatives 2, 3, and 4, the designation of the public lands in the planning area as a weed management area would provide guidance and resources to combat invasions of noxious weeds **and invasive species**. Reducing miles of road for motor vehicle use would slightly reduce the risk of spreading certain noxious weeds **and invasive species** from the risk under Alternative 1. Implementing integrated vegetation treatment, including prescribed fire, could help control some noxious weeds **and invasive species**, but could spread others such as Lehmann's lovegrass. BLM would consider this possibility in project design and mitigation.

Under Alternative 4, removal of livestock grazing would reduce one risk factor in the introduction and spread of noxious weeds **and invasive species**. Further reduction in miles of roads for motor vehicle use would slightly reduce the risk of spreading certain noxious weeds **and invasive species** from the risk under all other alternatives.

### *Cumulative Impacts--Noxious Weeds*

One of the planning area's goals is to maintain and restore native plant diversity and abundance. Without ~~proper management~~ a vegetation management and control program, tamarisk (salt cedar) and other species such as Lehmann's lovegrass can crowd out native species and dominate the landscape. **This would be more likely to occur over the long-term under Alternative 1 (Current Management) where a weed management area is not designated, a vegetation treatment program is not established, and specific actions to monitor and control exotic species where feasible are not prescribed. Under Alternatives 2, 3 and 4, these management prescriptions are made, thereby, increasing the likelihood of elimination or control of noxious weeds and invasive species. Under all alternatives**, residential developments are another **potential** source of noxious weeds **and invasive species**. As the surrounding area continues to grow, the risk of noxious weeds **establishing and invasive species spreading** on the public lands increases.

**Regardless of the alternative, certain invasive species such as Lehmann's lovegrass remain difficult, if not impossible, to eradicate or control once they become established. Lehmann's lovegrass is already established in the planning area. Over the long-term, unless researchers find new control measures, Lehmann's lovegrass may continue to spread and replace large areas of native grasses in the planning area.**

## Impacts to Wetland/Riparian Areas

**Scope of Analysis:** This section uses changes in riparian condition and function and the ability to meet the riparian objective to compare the impacts of the alternatives on wetland and riparian areas.

### *Impacts to Wetland/Riparian Areas from Alternative 1 (Current Management)*

#### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*

Watershed function is an important factor in maintaining stream function (Meehan 1991) and is extremely important to cienegas, which are sensitive to flood disturbance (Hendrickson and Minckley 1984). If the watershed condition and function eventually become degraded, correspondingly, rapid stream adjustments from changes in peak flows and sediment inputs would temporarily degrade riparian resources until the stream attains a new stable state.

Increased flood peaks might reduce the extent of cienega habitat. The riparian vegetation objective would not be met until upland watershed conditions are also met by reducing the amount of shrub invasion and increasing the desirable perennial grass component in the vegetation communities.

Under Alternative 1, the lack of vegetation management might result in conditions that prevent Cienega Creek from meeting the riparian objective. Watershed function is an important factor in maintaining stream function (Meehan 1991) and is extremely important to cienegas, which are sensitive to flood disturbance (Hendrickson and Minckley 1984). If the watershed condition and function eventually become degraded from decreased soil stability and decreased cover from shrub invasion then, correspondingly, rapid stream adjustments from changes in peak flows and sediment inputs would temporarily degrade riparian resources until the stream attains a new quasi-stable state. Increased flood peaks are likely to reduce the extent of cienega habitat through incision (Hendrickson and Minckley ~~1994~~ 1984).

*Fish and Wildlife, Visual and Cultural Resource Management*

Under Alternative 1, fish and wildlife management, visual resource management, and cultural resource management would not affect riparian/wetland areas.

**From Land Use Allocations**

*Mineral Development*

Although the area open to mining under Alternative 1 is a relatively small percentage of the public lands, the riparian objective might not be met if large-scale mineral development occurs on these areas or on surrounding lands in the watershed. Large-scale mineral development could lower water quality and quantity. Water quality might be lowered by increased sedimentation from large-scale soil disturbance and inadvertent release of toxic materials (Nelson et al. 1991).

Surface water is limited in the Cienega Creek and Babocomari River basins. Extracting water for large-scale mining would reduce aquatic and riparian habitat. Large mines often result in an influx of development to support miners. New water developments for supporting new businesses and residences could reduce groundwater that ultimately feeds Cienega Creek and other riparian habitats. The harm could be negligible to severe depending on the scale, location, and type of mine.

*Utility Rights-of-Way and Land Use Authorizations*

Adding new utilities under Alternative 1 would still allow the riparian objective to be met unless utilities proliferate and have a widespread effect on watershed conditions. Increases in sedimentation and runoff from utility corridor development could be substantial. BLM would discourage utilities from crossing riparian zones, but a major utility could greatly degrade these areas. Such degradation could lead to bank instability and sedimentation but would be mitigated because of the high value of the resources, including endangered species.

*Off-Highway Vehicle Management*

Limiting off-highway vehicle travel to designated roads under Alternative 1 would protect riparian vegetation and banks from disturbance from cross-country vehicle traffic and should facilitate meeting the riparian objective.

*Road Designations*

The 11 fords that cross Cienega Creek are a source of sedimentation to the creek. These crossings provide access to recreation and

extend the area of disturbance. This source of degradation would slightly harm riparian function under Alternative 1.

*Recreation Management*

The lack of designated recreation zones under Alternative 1 would interfere with meeting the riparian objective only if use levels increase dramatically. Recreation is light in the riparian area along Cienega Creek and Mattie Canyon, but is heavy enough in Upper Empire Gulch to create some trails and light bank damage. As recreation increases in the planning area, visitors would create more hiking trails where roads provide access. Water and shade of riparian areas attract people. Bank and floodplain soils are fragile within the planning area's riparian zones. Trails and bank damage are likely to promote erosion and retard ripariandevelopment in some areas in the future as visitation to the planning area increases. If bank damage becomes extensive, the stream channel would adjust from bank erosion and sedimentation to become wider and more shallow in profile with fewer deep pools (Rosgen 1996).

*Arizona Trail*

Alternative 1 would not designate a trail corridor, but the lack of such a corridor would not affect wetland/riparian areas.

*Livestock Grazing*

Watershed function is important in maintaining stream function (Meehan 1991) and is extremely important to cienegas, which are sensitive to flood disturbance (Hendrickson and Minckley 1984). A benefit from the improved watershed condition is the improvement of riparian conditions and later aggrading of the Cienega Creek base level, increasing the capacity of the aquifer in the valley. In the short-term, decreased runoff and improved water retention on uplands are expected to reduce peak flood flows and increase infiltration and aquifer recharge. But without upland vegetation treatments, over time shrub invasion is likely to offset gains made through advances in grazing practices (See Impacts to **Wetland**/Riparian areas **from watershed management above**).

The overall impact of continued implementing of current grazing plans under Alternative 1 would be exclusion of livestock and their direct impacts from most of the riparian zone on Cienega Creek, Mattie Canyon, and Empire Gulch on the Empire-Cienega and Empirita allotments. This exclusion would allow plant succession within these riparian areas to progress rapidly toward the potential natural community, either the cottonwood-willow community or the interior marshland complex. The trend is away from a cottonwood-willow plant community toward a marshland (cienega) with a willow component. Increases in vegetation cover, structure, and composition in the riparian zone would improve bank stability and result in a more stable and flood-resistant channel morphology (Hendrickson and Minckley 1984; Platts 1991). Improved riparian function is expected to increase overbank flow, shallow aquifer water capacity, and recharge, increasing the creek's drought resistance and enhancing riparian development.

For about six weeks during the summer, cattle simultaneously graze and use Cinco Ponds as water points. In some years they graze herbaceous vegetation to the waterline and heavily trample banks. Bulrush and other riparian plants regrow after cattle move to another pasture. Sedimentation and accumulation of cattle waste products diminish water quality. Bank damage would likely result in the filling and widening of these ponds, slowly leading to less open water and more coverage by aquatic plants. Grazing of these ponds would directly harm the riparian plant community and the longevity of open water.

During the short-term, the use of six existing lanes to allow cattle to cross Cienega Creek for pasture rotation would negligibly affect the soils and disturb vegetation and stream banks on up to ~~four~~ about 8.3 acres of riparian habitat. Cattle would probably use only an individual lane once a year for ~~just over a week~~ up to 21 days. While using these lanes, they would trample the soil, decreasing bank stability and increasing the opportunity for localized water erosion from soil disturbance.

Livestock are now grazing along ~~two~~ 1.5 miles of perennial Cienega Creek every other year during the winter (non-growing season) only. The use area is about 26 acres. The riparian condition data shows an improving trend and satisfactory condition. Restricting grazing in this area to winter-use is expected to continue in order to promote desirable habitat features such as vigorous plant growth and good bank stability. The livestock operator is currently fencing this reach to exclude livestock during the growing season to mitigate any direct impacts.

#### From Special Designations

*Areas of Critical Environmental Concern*
Alternative 1 would designate no more ACECs with specific management actions to protect sensitive wetland and aquatic areas. The lack of ACEC designation and management prescriptions for these areas would be harmful compared to the other alternatives.

### *Impacts to Wetland/Riparian Areas from Alternative 2*

#### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*
Improved watershed condition under Alternative 2 would benefit wetland and aquatic areas. Treatments to reduce shrubs and increase perennial grass cover would further reduce sedimentation and the frequency of peak flood flows and increase groundwater recharge, which feeds springs that support the planning area's riparian plant communities.

But prescribed fire might cause localized short-term harm from loss of mature cottonwood, willow, ash, and walnut trees should it temporarily get out of control. Individual burn plans for each year would incorporate mitigation to reduce the risk of damage to riparian areas. The small acreage likely to be burned and the relatively high humidity and fuel moisture would protect most of the trees and other riparian plants closer to the stream channel.

Riparian plant communities of semidesert grasslands have burned periodically (Davis 1994), and this burning has influenced the plant community. Limited accidental burning of riparian zones would likely cause limited short-term harm to these areas.

BLM would design herbicide use for removing invasive or exotic plants to mitigate most potential harm to non-target plants and animals and further analyze potential impacts in site-specific treatment plans.

Upland vegetation treatments that offset the influence of grazing on shrub invasion would lessen the impacts of grazing to the watershed's long-term health, thereby, improving hydrologic relationships and reducing sediment loads.

*Fish and Wildlife Management*
Proposed actions common to Alternatives 2, 3, and 4 for fish and wildlife management would benefit wetland/riparian areas. Securing an instream flow water right would help assure the sustainability of perennial water in Cienega Creek over the long-term, helping maintain the biodiversity in the basin for future generations.

Restrictions on livestock and recreation use of riparian areas to protect threatened and endangered species would also protect riparian vegetation and stream banks.

Reintroducing beaver would affect channel geometry and riparian expression in several ways. Beaver dams would slow and spread out flood waters onto floodplains where channel widths are expansive. Dams would cause erosion along the perimeter of the new floodplain in incised stream segments created after the drought and flood cycle of the1890s. This erosion would further widen narrow areas.

Dams are also likely to cause evulsion (the dramatic lateral change in channel location following a flood) of the stream channel onto the floodplain, allowing greater lateral migration of the channel and expanding the surface area of marsh habitat. Beaver activity, particularly new dam building, would follow this evulsion process. This activity would also serve to stabilize and elevate the channel over time by slowing the headward movement of gully erosion and by trapping sediment that fills beaver ponds.

Because Cienega Creek flows through a wide valley basin with floodplains ranging up to a half mile across and with a gentle slope less than 1%, most of the stream can accommodate physical changes caused by beaver dams. Vegetation would respond to tree felling by resprouting from downed limbs and stump bases and in so doing would enhance aquatic habitat diversity. Ground water elevations might rise as the channel as a whole aggrades. Overbank flooding and storm flow retention time is likely to increase bank recharge. Poole (1999) has shown that this type of recharge can be important to the overall water budget in the adjacent San Pedro Basin.

*Visual and Cultural Resource Management*

Proposed actions common to Alternatives 2, 3, and 4 for visual and cultural resource management would generally not affect wetland/riparian areas. Public information about wetland/riparian areas at the Empire Ranch headquarters would lead to increased public awareness. This awareness would likely contribute to increased public support for further constraints on activities that are detrimental to riparian/wetland areas in the basin and benefit these areas.

**From Land Use Allocations**

*Mineral Development*

By eliminating the potential for mining on public lands, Alternative 2 would greatly reduce the risk of impacts of mines (riparian habitat degradation from sedimentation, excessive water use, and contamination), which are described for Alternative 1. Some of these impacts could still occur if large-scale mines are developed on surrounding lands.

*Utility Rights-of-Way and Land Use Authorizations*

Designating utility corridors away from riparian areas under Alternative 2 would eliminate the risk of new utilities directly affecting these areas, as might occur under Alternative 1. The single "aerial" crossing of the existing corridor ~~little~~ **minimally** affects the riparian area. Future utilities using this corridor would likely apply the same mitigation. Restricting service roads to upland areas would prevent direct harm to riparian areas.

*Off-Highway Vehicle Management*

Off-highway vehicle management under Alternative 2 would affect riparian areas the same as under Alternative 1.

*Road Designations*
Only one of the 11 road crossings through wetland/riparian areas would remain under Alternative 2. Retiring and rehabilitating these road crossings on the floodplain would alleviate the bank erosion and sedimentation that would occur under Alternative 1.

*Recreation Management*
Foot and horse traffic along Cienega Creek would increase as the planning area becomes better known to the public. Erosion is likely to greatly increase if hikers and horseback riders create trails on the fragile soils along the banks or floodplain of Cienega Creek. Alternative 2 would better protect the riparian area along Cienega Creek than would Alternative 1. Recreation is likely to be slightly to moderately harmful to riparian areas. Establishing a recreation permit system would help ensure that use levels help maintain riparian function and condition.

*Arizona Trail*
Under Alternative 2, the Arizona Trail would not be located close enough to the riparian area to have a direct impact. But extra visitation by hikers might slightly degrade bank stability and vegetation. Hikers wanting access to the riparian area are likely over time to create small wildcat spur trails.

*Livestock Grazing*
Management of livestock grazing under Alternative 2 is likely to benefit riparian areas more than under Alternative 1, because of the improvement in watershed conditions as a result of vegetation treatments, including prescribed fire, coupled with variable stocking rates and flexible rotation systems determined by resource conditions through biological planning. Livestock exclosures on Cienega Creek below the Narrows and at Nogales and Little Nogales Springs would ensure that the vegetation would reach its potential natural state in the least amount of time and with fewest setbacks from livestock management problems.

During the short-term, the use of ~~six~~ **five** existing ~~and two proposed~~ lanes on Cienega Creek **and one new lane on Empire Gulch** to allow cattle to cross Cienega Creek **and Empire Gulch** for pasture rotation would ~~negligibly~~ **negatively** affect the soils and disturb vegetation and stream banks on up to ~~five~~ **8.3** acres of riparian habitat, ~~slightly more than~~ **about the same as under** Alternative 1. Cattle may use an individual lane for up to three weeks, usually every other year. While using these lanes, they would trample the soil, decreasing bank stability and increasing the opportunity for localized water erosion from soil disturbance. **Hardening of lanes that show erosion or are becoming so boggy as to impede crossing by livestock, with rock would lessen these impacts. Construction of an upland water in the 49 Wash confluence area which would result in conversion of A&B pastures to a lane would lessen impacts to wetland/riparian areas even further.**

**Winter use of the Narrows riparian pasture and winter-spring use of A & B pastures by livestock along about 1.5 miles of creek (26 acres of riparian) would result in some trampling of riparian vegetation and banks along about 8.6% of the total riparian area. The result could be a decrease in bank stability and some loss of riparian vegetation along nearly two miles of the riparian area. Construction of an upland water in the area of the 49 Wash confluence with Cienega Creek would result in conversion of A & B pastures to a lane would be beneficial to wetland and riparian areas by further reducing livestock impacts along one-half mile of riparian area.**

**Under Alternative 2, livestock use of Cinco ponds and other wetland areas in the floodplain of Cienega Creek would be modified to ensure that these areas are in proper functioning condition and in accord with threatened and endangered species management needs.**

Initially, one or more of Cinco ponds would be excluded from livestock use. The resulting ecological changes would be studied to determine the best management practices for balancing both desired ecological condition and special status species needs.

Public lands in the Rose Tree Ranch, Vera Earl Ranch, and Empire Mountains would benefit from the more intensive management and collaboration under Alternative 2, including completion of ecological site inventories and monitoring. Improvements in watershed condition on all allotments should indirectly benefit riparian and wetland areas. Implementing the biological planning process on all allotments should help recognize and resolve resource conflicts and also indirectly benefit these areas.

#### From Special Designations

*Areas of Critical Environmental Concern*
ACEC designation under Alternative 2 would emphasize agency conservation of watershed health and processes that benefit riparian and stream conditions. This designation would direct more agency resources to conserving the planning area's riparian resources and benefit riparian/wetland areas.

#### *Cumulative Impacts--Alternative 2 on Wetland/Riparian Areas*

Upstream improvement in watershed conditions might benefit downstream segments of Cienega Creek into Tucson through indirect and cumulative benefits such as reduced flood peak discharge, attenuating flood discharge, and increased base discharge (Hendrickson and Minckley 1984).

The implementation of the proposed Las Cienegas Acquisition Strategy (Appendix 2) will preserve watershed condition of the NCA resulting in long-term positive impact to wetland and riparian areas. Developments of private and State Trust Lands is a near certainty if the human population in southern Arizona continues to grow. Large scale development can change runoff and sediment relationships resulting in the destabilization of stream channels (Dunne and Leopold 1978). This destabilization can result in the rapid erosion of perennial, and intermittent stream channels that support wetland/riparian plant communities. Past watershed disturbances have resulted in deep down cutting and subsequent draining of aquifers that feed these areas composed of fragile soils (Hendrickson and Minckley 1984).

### *Impacts to Wetland/Riparian Areas from Alternative 3*

#### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 3 would be the same as under Alternative 2.

#### From Land Use Allocations

*Mineral Development*
Mineral development under Alternative 3 could affect riparian areas more than under Alternative 1, because areas open to mineral development would be more extensive and have a greater potential for more large-scale mineral development. But Alternative 3 would protect Cienega Creek, Lower Empire Gulch, Cinco Ponds, Mattie Canyon, and Nogales and Little Nogales Springs from direct impacts of mineral entry and surface disturbance.

*Utility Rights-of-Way and Land Use Authorizations*
Utility rights-of-way and land use authorizations under Alternative 3 would affect riparian areas the same as under Alternative 2.

*Off-Highway Vehicle Management*
Off-highway vehicle management under Alternative 3 would affect riparian areas the same as under Alternative 1.

*Road Designations*
Road closures and restrictions under Alternative 3 would affect riparian areas much as they would under Alternative 2, except that Alternative 3 would close and rehabilitate a smaller acreage of roads.

*Recreation Management*
Under Alternative 3 recreation would affect riparian areas the same as under Alternative 2.

*Arizona Trail*
Under Alternative 3, the Arizona Trail would follow the riparian area through the Narrows and pass over fragile floodplain soils. Later, flooding might start erosion causing the trail to down cut. Down cutting might create secondary channels that would disturb stream function. Hikers leaving the trail might to some degree disturb bank stability and vegetation, depending on the level of use. If the trail passes over the floodplain, channel adjustments would directly harm riparian resources and channel function. The impacts would be greater than under the route proposed by Alternative 2.

*Livestock Grazing*
Livestock grazing management under Alternative 3 might impair watershed condition during drought. Because watershed function is integral to riparian function through effects on the hydrologic response to watershed conditions, livestock grazing could harm riparian area condition and stream channel function. Reductions in watershed cover might increase runoff, flood peaks, and sedimentation, and decrease aquifer recharge and base flows (Dunne and Leopold 1995; Thurow 1991). Because few livestock would graze in riparian areas, vegetation is likely to buffer the channel against erosion and somewhat filter excess sediments.

Livestock ~~would continue to~~ use of Cinco Ponds, ~~and degrade the area much as they would under Alternative 1~~ **under Alternative 3, would have a greater degree of negative impact than under Alternative 2.** Impacts from crossing lanes, livestock waters, and other improvements under Alternative 3 would be the same as under Alternative 2. Overall, grazing management under Alternative 3 would degrade riparian condition and function more than under Alternatives 1 or 2 **primarily due to reduced conditions of upland areas from fixed numbers of livestock grazing during drought periods when numbers exceed the current carrying capacity of the vegetation. This is likely to increase runoff and sediment rates causing some level of stream channel adjustment to Cienega Creek and its tributaries.**

**From Special Designations**

*Areas of Critical Environmental Concern*
Alternative 3 would reduce the area within ACECs by about 90% compared to Alternative 2. Nevertheless, ACECs would still cover most riparian areas and valley bottoms including: Cienega Creek, Cinco Ponds, Lower Empire Gulch, Mattie Canyon, and Nogales and Little Nogales Springs. Upper Empire Gulch would not be protected by ACEC designation and management emphasis to maintain ecological integrity. The impact of ACEC management to riparian areas under Alternative 3 would be more beneficial than under Alternative 1, which would designate no more ACECs.

### *Cumulative Impacts–Alternative 3 on Wetland/Riparian Areas*
Cumulative impacts under Alternative 3 would be the same as under Alternative 2.

## *Impacts to Wetland/Riparian Areas from Alternative 4*

### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

### From Land Use Allocations

*Mineral Development*
Under Alternative 4, mineral development would affect riparian areas the same as under Alternative 2.

*Utility Rights-of-Way and Land Use Authorizations*
Utility rights-of-way and land use authorizations under Alternative 4 would affect riparian areas the same as under Alternative 2.

*Off-Highway Vehicle Management*
Off-highway vehicle management under Alternative 4 would affect riparian areas the same as under Alternative 1.

*Road Designations*
Road closures and restrictions under Alternative 4 would affect riparian areas the same as under Alternative 2.

*Recreation Management*
Under Alternative 4, recreation would affect riparian areas the same as under Alternative 2.

*Arizona Trail*
The Arizona Trail under Alternative 4 would affect riparian areas the same as under Alternative 2. The impacts of a minor increase in disturbed land in the watershed, resulting from the creation of a new trail under Alternative 2, would be negligible and comparable to impacts from restricting the trail to shared use on existing roads under Alternative 4.

*Livestock Grazing*
Grazing management under Alternative 4 would benefit riparian resources. Eliminating livestock grazing on public lands under Alternative 4 would affect riparian areas in much the same way as under Alternatives 1, 2, and 3, since these alternatives would virtually eliminate direct cattle impacts to riparian areas. The difference is that Alternative 4 would eliminate existing crossing lanes **and watering areas**, which would further improve riparian condition in ~~1,800 linear feet~~ **about 1.5 miles** of riparian area (~~four~~ **34** acres) along Cienega Creek. In addition, Cinco Ponds would remain undisturbed by heavy grazing and bank trampling. Alternative 4 would also benefit watershed condition and function by eliminating impacts from livestock and range improvements in the uplands on public lands and might indirectly benefit the riparian system. An improvement of some degree in watershed function is expected to result in the following benefits to riparian resources:

- Decreased peak flows.
- Decreased sedimentation.
- Increased infiltration and aquifer recharge.
- Increased duration and length of perennial flow.

But the failure of the management of the State Trust and private lands next to the BLM properties to provide desirable vegetation and soil relationships could degrade sensitive riparian and aquatic habitats on the public lands to unacceptable levels (See **Impacts to Wetland /Riparian Areas from watershed management under Alternative 2** above ~~watershed section~~).

**From Special Designations**

*Areas of Critical Environmental Concern*
Under Alternative 4, ACEC management would affect riparian areas the same as under Alternative 2.

### *Cumulative Impacts–Alternative 4 on Wetland/Riparian Areas*

Under Alternative 4, watershed function would improve on 41,855 acres of BLM-managed land or 29% of the Upper Cienega Creek watershed. This is not expected to be the case on adjacent State Trust and private lands (See Impacts to Watershed section above). Upstream improvement in watershed conditions on public lands might be overshadowed by degradation elsewhere in the watershed. Such changes are likely to result in the following:

- Increased peak discharges during floods.
- Increased sedimentation.
- Decreased recharge.
- Increased water withdrawals resulting in decreased base discharge. All of these changes are likely to culminate in indirect, cumulative long-term harm to cienega-type wetlands (Hendrickson and Minckley 1984).

The implementation of the proposed Las Cienegas Acquisition Strategy (Appendix 2) has the potential to off-set much of the negative impacts to watershed function that lead to wetland degradation. However the acquisition area is likely too small to prevent the influences of future high density development in the area which is likely to occur if southern Arizona's human population continues to grow. The water consumption in the basin as the population increases will likely have a negative impact on base flows in Cienega Creek and other wetland areas. This will likely occur through incremental reductions in discharge as more ground water is intercepted from these areas through ground water withdrawals to support additional housing and industrial development.

## Impacts to Fish and Aquatic Wildlife

**Scope of Analysis:** This section uses changes in habitat features and populations of fish and aquatic wildlife to compare the impacts of the alternatives on fish and aquatic wildlife.

### *Impacts to Fish and Aquatic Wildlife from Alternative 1 (Current Management)*

**From Desired Resource Conditions**

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*
Under Alternative 1, the lack of integrated vegetation management might create conditions that prevent Cienega Creek from meeting the aquatic portion of the riparian objective over the long-term and would harm federally listed aquatic wildlife and plants. Watershed function is important in maintaining stream function (Meehan 1991) and is extremely important to cienegas, which are sensitive to flood disturbance (Hendrickson and Minckley 1984). Under Alternative 1, habitat changes including loss of pools from sedimentation and loss of cover from channel adjustments would degrade aquatic habitat important to federally listed and other wildlife (See Alternative 1: Impacts to Watershed section).

*Fish and Wildlife Management*
Under all alternatives, BLM would consult with the U.S. Fish and Wildlife Service on all projects that might affect any listed species or critical habitat. This consultation would ensure that activities in aquatic environments are fully mitigated and their adverse impacts on endangered or threatened species are minimized. The range of the Gila topminnow would be extended to improve the status of the Cienega

Creek lineage. Improvements in the status of endangered species would reduce the likelihood of extinction and might eventually lead to the recovery of the species to the point that it no longer needs to be listed.

*Visual Resource Management (VRM)*
Management as VRM Class III under Alternative 1 is not expected to affect aquatic habitat conditions and wildlife.

*Cultural Resource Management*
Cultural resource management under Alternative 1 would not affect fish and aquatic wildlife.

**From Land Use Allocations**

*Mineral Development*
The aquatic habitat portion of the riparian objective might not be met if mining becomes extensive in the planning area. Large-scale mineral development can affect both water quality and quantity. Surface water is limited in the Cienega Creek and Babocomari River basins. Extraction of water for large-scale mining would reduce aquatic habitat for native fishes, leopard frogs, Mexican garter snakes, and a host of migrating or nesting neotropical birds. Listed or soon to be listed under the Endangered Species Act of 1973 are the following species that could be affected by mineral development:

- Southwestern willow flycatcher
- Gila topminnow
- Huachuca water umbel
- Gila chub
- Yellow-billed cuckoo
- Chiricahua leopard frog

Large mines often result in an influx of development close to the mine to support workers. New water developments used to support new businesses and residences could lower the ground water that ultimately feeds Cienega Creek and other aquatic habitats (Naeser and St. John 1996).

In addition, an increase in the population next to the planning area would likely increase pressure for sport fishing. This pressure could lead to an increased incidence of illegal fish introductions for sport fishing and could devastate native fish communities (Minckley and Deacon 1991). The harm to aquatic habitat and wildlife species could be negligible to severe depending on a variety of factors including: the scale, location, type of mine, location of resident miners, and potential for mitigation.

*Utility Rights-of-Way and Land Use Authorizations*
Adding new utility lines would not interfere with BLM's meeting the aquatic habitat portion of the riparian objective unless the lines expand and have a widespread effect on watershed conditions or encourage increased urbanization in the basin. Utility corridor development could substantially increase sedimentation and runoff under Alternative 1. BLM would discourage utilities from crossing riparian zones, but a major utility could substantially degrade these areas and cause bank instability and sedimentation. Alternative 1 would discourage utilities from crossing the riparian zone, but utilities might still cross riparian and aquatic habitat. Heavy construction equipment and disturbance might slightly to moderately disturb habitats important to federally listed and other fish and aquatic wildlife.

Other infrastructure, such as utility lines, would facilitate or encourage the development of the basin which includes thousands of acres of State Trust and private lands. Such development would likely alter hydrologic function (Dunne and Leopold 1995; Naeser and St. John 1996). Cienegas in the basin are fragile wetlands that would likely be disturbed greatly by such changes (Hendrickson and Minckley 1984). Degradation from the corridor itself would be

mitigated to the extent possible because of the high value of the resources, including endangered species.

*Off-Highway Vehicle Management*
Under Alternative 1, limiting off-highway vehicle (OHV) travel to designated roads should help meet the aquatic portion of the riparian objective. This restriction would protect the following:

- Aquatic wildlife from harassment.
- Habitat conditions, especially stream banks, from OHV degradation.
- Habitats important to federally listed and other aquatic wildlife

*Road Designations*
Under Alternative 1, motor vehicles use ~~136.7~~ 134.7 miles of roads (public and administrative use) under partial implementation of the designated road system. Restricting vehicles to these roads helps meet the aquatic habitat objective. The 11 fords that cross Cienega Creek are a minor source of sedimentation to the creek. But they are eroding at increasing rates, adding to sedimentation caused by widespread soil piping on abandoned floodplains along Cienega Creek and Mattie Canyon. These crossings provide access for recreation, extend the area of disturbance, and allow ample opportunity for the illegal transport of nonnative fish. The potential impact of these crossings ranges from small adverse impacts from sedimentation and fish injury to the large adverse impact of facilitating the introducing of illegal sport fish.

*Recreation Management*
Although recreation zones are not established under Alternative 1, the aquatic portion of the riparian objective would be met unless recreation use levels rise dramatically. Alternative 1 would degrade stream banks to a limited extent as recreation increases in riparian areas.

Recreation is light in the riparian area along Cienega Creek and Mattie Canyon, but is heavy enough in Upper Empire Gulch to create some trails and light bank damage. As recreation increases in the planning area, visitors would create more hiking trails where roads provide access to riparian areas. The water and shade of riparian areas attract people. Bank and floodplains soils are fragile within the planning area's riparian zones (See BLM 1987c). Trails and bank damage from increasing visitor use are likely to promote erosion and retard the growth of riparian plants on stream banks. This damage would disturb habitat features for fish and aquatic wildlife species in some of the more popular areas. If bank damage becomes extensive, the stream channel would adjust from bank erosion and sedimentation to become wider and more shallow in profile with fewer deep pools (**as described in the Alternative 1 Impacts to Wetland/Riparian Areas Recreation Management section above**).

The presence of large-pool habitat and the potential for fishing could encourage the illegal stocking of Cienega Creek with sport fish. But the Arizona Game and Fish Commission's closing of Cienega Creek to fishing has diminished this risk. Proper signing of the area would further diminish this risk. Thick vegetation and the muddiness of the creek limit foot traffic across the creek. Trampling along the creek's shallow margins is likely to subject Gila topminnow to a small level of mortality. These risks would become more serious as the area either becomes more popular or as the basin is developed for residential communities, which is the long-term trend (Naeser and St. John 1996).

*Arizona Trail*

The lack of a designated route for the Arizona Trail under Alternative 1 would not affect fish and aquatic wildlife.

*Livestock Grazing*

Under Alternative 1, current livestock management, with limited use of aquatic habitat and the riparian zone by livestock, is increasing the habitat elements important to fish. These elements include: woody cover, undercut banks, average pool depth, and overhanging cover.

For about six weeks during the summer, cattle simultaneously graze and use Cinco Ponds as water points. Cinco Ponds support native leopard frogs, breeding ducks, and rails. Heavy grazing during the summer subjects frogs and tadpoles to decreased cover and water quality. Heavy grazing and bank trampling reduce the quality and quantity of habitats for frogs, ducks, and rails. Sedimentation and accumulation of cattle waste products diminish water quality.

Other impacts to these ponds from grazing can be both harmful and beneficial. On the one hand, bank damage would likely result in the filling and widening of these ponds, slowly leading to less open water and more coverage by aquatic plants and speeding their natural progression to wet meadows. This thick vegetation is ideal cover for rails and many other bird species. But grazing of these ponds would directly harm aquatic habitats by reducing the longevity of open water needed to support leopard frogs, ducks, and future fish introductions.

On the other hand, by cropping off large volumes of aquatic plants, grazing can reduce the biomass of plant material deposited annually. This reduction in biomass also opens up some of the ponds that would otherwise have a complete stand of emergent vegetation and provides open water for ducks, fish, and frogs. **The reduction in plant material also attracts bullfrogs which have recently populated these ponds. Remedies to bullfrog establishment include special fencing and removal. Ridding an area of bullfrogs even with these treatments have been shown to be problematic throughout southern Arizona.**

Livestock use of six existing crossing lanes on Cienega Creek would harm fish and fish habitat, directly affecting 1,800 linear feet (0.4 acres) of aquatic habitat. Large numbers of cattle crossing the creek are likely to injure small numbers of topminnow and other fish, frogs, and garter snakes. But, overall, harm to fish, frog, snake, and flycatcher populations is expected to be minor.

Indirect effects of livestock using these crossings would include trampling of the soil and the resulting decreased bank stability and lowering of water quality. This impact in turn increases the opportunity for localized water erosion from soil disturbance, which degrades fish habitat by covering food organisms with silt. The intermittent use of these lanes for cattle to cross the creek for pasture rotation in the short term would degrade the 0.4 acres **of aquatic habitat** involved.

Livestock are also grazing ~~two~~ about **1.5** miles of perennial Cienega Creek every other year; **about 0.5 miles** during the winter (non-growing season) only **and about one mile during winter and spring.** Riparian condition data show an improving trend and satisfactory condition. Winter-use is expected to continue until the reach is fenced to exclude livestock from the riparian area to mitigate most direct impacts of the grazing operation on federally listed fish.

Although fish populations might experience limited short-term harm from the existing livestock grazing plan, livestock grazing is not compromising the overall health of topminnow and Gila chub populations. Species such as the

Southwestern willow flycatcher, Mexican garter snake, and Chiricahua leopard frog are likely benefitting from increased vegetation density in aquatic habitats under the present grazing regime.

The diminutive Huachuca water umbel, on the other hand, might not be as likely to survive where other aquatic and semiaquatic plants limit exposed soil, light, and nutrients. Likewise, longfin dace would likely become less abundant with the continued loss of open, wide, shallow, sandy habitats to those of well-vegetated marsh or deeper, narrower pool habitats. Cattle do attract and support cowbirds, which lay parasitic eggs in the nests of Southwestern willow flycatchers and other riparian nesting birds (See Impacts to Terrestrial Wildlife section below). This attraction can be considered an adverse impact.

Stock ponds provide an opportunity for the illegal stocking of sport fish and refuges for dispersing bull frogs. These alien fish and frogs threaten native fish and frogs. To mitigate the probability of contaminating stock waters by the public's illegal transplanting of nonnative fishes , these water sources would be supplied with water on a seasonal basis only and would be allowed to dry annually. These "repressos" would dry up naturally in one to three months after pumping stops.

Only a few stock waters catch rain runoff that allows for extended persistence. Of these, none have perennial surface water. The risk to the fish community in Cienega Creek from developing these waters is small. This aspect of the grazing plan is not likely to harm Gila topminnow, longfin dace, or Gila chub.

#### *Empirita Allotment*

The present proposal to exclude grazing at the Narrows on Cienega Creek would provide a high level of protection for Gila topminnow habitat. No catchments that might attract sport fish or bull frogs that could contaminate aquatic habitat with native species are planned for or operated on public land in this allotment.

#### *Vera Earl and Rose Tree Allotments*

No catchments that might attract sport fish or bull frogs that could contaminate topminnow sites are planned for or operated on public land in these allotments, and no perennial stream segments are present. Therefore, livestock grazing under Alternative 1 on these allotments would not affect fish and aquatic wildlife.

#### From Special Designations

*Areas of Critical Environmental Concern*

Lack of designation of ACECs in sensitive riparian areas could deny important protective management to fish and aquatic wildlife (~~See the impacts to~~ **as described in the Alternative 1: Impacts to Wetland/Riparian Areas from ACEC management above**).

### *Summary--Alternative 1 on Fish and Aquatic Wildlife*

Alternative 1 could meet the aquatic portion of the riparian objective in the short- and long-term with few long- or short-term negative impacts. As a result, a host of aquatic wildlife species, plants, and rare aquatic habitat types would benefit. BLM would restrict off-highway vehicles and livestock grazing to the point where impacts on aquatic habitat and populations of federally listed fish, frogs, and plants would be limited to the following:

- Cinco Ponds
- ~~2~~ 1.5 miles of Cienega Creek (until ~~fenced in 2001~~ **replacement upland waters developed**)
- 1,800 feet of creek within crossing lanes
- Nogales and Little Nogales Springs

Another 1,700 feet of Cienega Creek would be

fenced to exclude livestock from the riparian area at the most northerly stream reach.

If use levels greatly increase, recreation could create enough damage to cause widespread and long-term disturbance to stream banks and vegetation, which form the structure of aquatic habitat. Increased recreation and urbanization in the basin could lead to the illegal stocking of Cienega Creek and other waters with nonnative fishes, bull frogs, or crayfish, which would permanently devastate populations of native aquatic animals.

Ultimately, changes in watershed conditions from shrub invasion (as a result of full fire suppression), widespread residential development, or large-scale mining could change aquifer elevations, duration of surface flows, sedimentation, and flood flows. The result would be bank erosion and undesirable changes in riparian and aquatic habitat, which would permanently harm wildlife populations that rely on Cienega Creek and other sensitive aquatic habitat types.

### *Impacts to Fish and Aquatic Wildlife from Alternative 2*

#### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*

Implementing a vegetation treatment program would create conditions that help Cienega Creek meet and maintain the aquatic portion of the riparian objective, thereby benefitting federally listed fish and aquatic wildlife and plants. Upland vegetation management would enhance riparian development and channel stability by reducing the prevalence of shrubs. Such management would also increase watershed cover by promoting increased perennial grasses. The fish and aquatic wildlife and plants in Cienega Creek would benefit from a low level of sediment supply that promotes channel stability. Lower sedimentation and higher channel stability would promote habitat development with a diversity of conditions, including the following:

- High levels of instream cover.
- A large range of depths and velocities.
- Riparian canopy cover that lessens seasonal extremes in water temperatures.

Controlled burning might lower water quality for fish and frogs for short periods over limited distances of stream habitat. Precautions such as small burn unit size and sequencing of burn plots over individual sub-basins would make the influx of ash to Cienega Creek unlikely to reach concentrations that would kill fish and wildlife. The influx of sediments from burned areas is not expected to reach levels that would alter aquatic habitat composition and characteristics except when close to the tributary carrying the sediment.

Fire reaching the riparian area might cause a temporary loss over a limited area of cover used by waterfowl such as ducks, snipes, and rails. Fire might also destroy garter snakes, mud turtles, young birds, and eggs. But prescribed fire is likely to inflict only minor harm to wildlife populations and habitat in riparian/aquatic areas.

BLM would design herbicide use to mitigate most potentially harmful impacts to nontarget plants and animals and would further analyze potential impacts in site-specific treatment plans.

*Fish and Wildlife Management*

Unlike current management, the fish and wildlife management actions common to ~~activity plans for~~ Alternatives 2, 3, and 4 would enhance the ability to restore natural diversity of fish and wildlife. These actions would more emphasize

protecting habitat for sensitive aquatic species than would Alternative 1.

Reintroductions or range extensions would conserve aquatic wildlife, including the desert pupfish, Gila topminnow, Gila chub, lowland leopard frog, and Chiricahua leopard frog and improve their chances for long-term survival. If their situation (i.e. security from extinction) improves, candidate species for listing might not need to be listed or listed species might be down listed.

Securing instream flow water rights would ensure sustainability of surface water in Cienega Creek essential to maintaining habitats and populations of fish and aquatic wildlife. Such animals include: Gila topminnow, Gila chub, longfin dace, leopard frog, and Mexican garter snake.

Reintroducing beaver would affect channel geometry and riparian expression in several ways as described for riparian/wetland areas. The result would be enhanced aquatic habitat diversity through increased velocity and depth diversity, especially in dammed back waters. Areas of increased stream temperatures, particularly on stream margins, are likely to improve rearing habitat for young cyprinid minnows and topminnows. Gains in stream temperature will be partially moderated by shading from riparian tree canopy cover.

**Controlling alien species like the introduced bullfrog would improve the ability of native species remain in wetlands in the NCA resulting in a positive impact for leopard frogs, Mexican garter snake and Sonoran mud turtle. In General, this is true of other alien species that may arrive in the future that compete, displace or prey upon native species.**

*Visual Resource Management (VRM)*
Visual resource management classes under Alternative 2 would not affect fish and aquatic wildlife.

*Cultural Resource Management*
Cultural resource management under Alternative 2 would not measurably affect fish and aquatic wildlife and plants. The Empire Ranch headquarters' interpretive and educational program could increase public awareness of fish and aquatic wildlife species and habitats. This awareness would likely contribute to increased public support for further constraints on activities that harm native aquatic wildlife in the basin, thus benefitting these species.

**From Land Use Allocations**

*Mineral Development*
By eliminating the potential for mining and mineral leasing on public lands in the planning area, Alternative 2 would greatly reduce the risk of habitat degradation from sedimentation, unsustainable water use, and contamination. This action would ultimately improve aquatic habitat quantity and quality from that under Alternative 1. Increased security from habitat-altering land use practices would translate to increased security for populations of federally listed and common fish and aquatic wildlife and plants.

*Utility Rights-of-Way and Land Use Authorizations*
Alternative 2 would restrict utility rights-of-ways to existing corridors, thereby lessening the risk of disturbance from construction and maintenance of new utilities that would occur under Alternative 1. The limits on utility and other right-of-way authorizations would help minimize disturbance to the watershed, riparian area, and aquatic habitat. In addition, BLM would restrict infrastructure in the basin to support development. This restriction would inhibit suburban growth. Such growth would

harm aquatic habitats that support fish and aquatic wildlife and plants.

*Off-Highway Vehicle Management*
Under Alternative 2, off-highway vehicle management would affect fish and aquatic wildlife much as under Alternative 1.

*Road Designations*
The closing and rehabilitating of all but one road crossing ~~the creek~~ **perennial Cienega Creek** under Alternative 2 would help prevent excessive sedimentation from degrading aquatic habitats. Alternative 2 would present less risk than Alternative 1 of death or injury from vehicles, diminished water quality from vehicle fluids, and contamination of the creek from the illegal transfer of sport fish or other nonnative aquatic animals. Such contaminations would most certainly place the Cienega Creek fish community at risk of being lost and replaced by introduced nonnatives.

*Recreation Management*
Closing or limiting motor traffic access along Cienega Creek would prevent more degrading of habitat from increased sedimentation and bank damage by off-highway vehicles at 11 creek crossings. Foot and horse travel would increase along Cienega Creek as the planning area becomes more well known and recreation use increases. Increased travel is likely to slightly increase injury or death of Gila topminnow, which occupy the shallow margins of the creek in large numbers. This injury and mortality would only negligibly affect the Cienega Creek population of Gila topminnow.

Some curious sightseers would harass, pursue, and capture leopard frogs and Mexican garter snakes. Visitors are also likely to trample some Huachuca water umbels. The level of impact under Alternative 2 would be less than under Alternative 1. Establishing a recreation permit system should help ensure the sustainability of aquatic habitats and populations of aquatic species.

*Arizona Trail*
Under Alternative 2, foot and horse travel would increase along Cienega Creek as the Arizona Trail improves access to remote areas and attracts more visitors to the area. The result would be more impacts of the type described above for recreation management.

*Livestock Grazing*
Impacts from livestock grazing management under Alternative 2 would be similar to those under Alternative 1. Livestock use of ~~two additional~~ crossing lanes **and watering areas** will disturb ~~an additional 0.1~~ **about the same** acreage of aquatic habitat until alternate waters can be developed and then the aquatic acreage impacted would be reduced by about **one acre.** The expanded biological planning process should further help protect aquatic fish and wildlife through increased monitoring and improved watershed condition. Fencing of Nogales and Little Nogales Springs would protect these sensitive aquatic habitats from livestock impacts.

**From Special Designations**

*Areas of Critical Environmental Concern*
ACEC designation would emphasize improving watershed and riparian health. This emphasis would in turn benefit aquatic habitat used by fish and aquatic wildlife and plants. This designation would direct more BLM resources to conserving the planning area's fish and wildlife habitat and benefit fish and aquatic wildlife.

## *Impacts to Fish and Aquatic Wildlife from Alternative 3*

### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 3 would be the same as under Alternative 2.

### From Land Use Allocations

*Mineral Development*
Impacts under Alternative 3 would be similar tothose under Alternative 1, except that they might occur over a much larger area of the watershed. Alternative 3 would protect Cienega Creek, Lower Empire Gulch, Cinco Ponds, Mattie Canyon, and Nogales and Little Nogales Springs from direct surface disturbance. Upper Empire Gulch would not have the same protection from the direct impacts of mining.

*Utility Rights-of-Way and Land Use Authorizations*
Impacts under Alternative 3 would be the same as under Alternative 2.

*Off-Highway Vehicle Management*
Impacts under Alternative 3 would be the same as under Alternative 1.

*Road Designations*
Road closures and restrictions under Alternative 3 would affect fish and aquatic wildlife and plants much as under Alternative 2, except that under Alternative 3, BLM would close and rehabilitate a smaller acreage of roads.

*Recreation Management*
Recreation under Alternative 3 would affect fish and aquatic wildlife and plants much as under Alternative 2.

*Arizona Trail*
Alternative 3 would locate the Arizona Trail in the riparian area through the Narrows. Recreation levels high enough to allow bank erosion are likely to alter habitat properties, such as a change from narrow, deep pools with cover to wide, shallow pools. Channel adjustments from the trail, if located on the floodplain, would directly harm aquatic habitat, fish, and aquatic wildlife and plants in contrast to Alternative 1, which would not affect these habitats and species. A reduction in deep pool habitats would likely harm Gila chub, leopard frogs, and Sonoran mud turtles, which rely on these habitats. Use of the Arizona Trail could result in the following:

- Injury or death to Gila topminnow.
- Harassment of leopard frogs, Gila chubs, and Mexican garter snakes.
- Damage to vegetation cover.
- Trampling of stream banks.

*Livestock Grazing*
Livestock grazing management under Alternative 3 would affect fish and aquatic wildlife much as under Alternatives 1 and 2, except that watershed condition and function under Alternative 3 might suffer during droughts. This type of grazing management might be translated into adverse effects to the hydrology of Cienega Creek, including increased peak flow from flooding and sedimentation following extended droughts. Alternative 3 is more likely than Alternatives 1 or 2 to have a lasting negative impact over the long-term on aquatic habitats, fish, and aquatic wildlife and plants.

### From Special Designations

*Areas of Critical Environmental Concern*
Under Alternative 3, the planning area's ACEC would amount to only 4,859 acres (roughly 10% of that under Alternatives 2 and 4) but would still cover most aquatic habitats including:

Cinco Ponds, Lower Empire Gulch, Mattie Canyon, and Nogales and Little Nogales Springs. The ecological integrity of Upper Empire Gulch would not be protected by ACEC designation and management emphasis. The impact to fish and aquatic wildlife and plants would be more beneficial than under Alternative 1, but not as beneficial as under Alternatives 2 and 4.

## *Impacts to Fish and Aquatic Wildlife from Alternative 4*

### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

### From Land Use Allocations

*Mineral Development*
Mineral development under Alternative 4 would affect fish and aquatic wildlife the same as under Alternative 2.

*Utility Rights-of-Way and Land Use Authorizations*
Utility rights-of-way and land use authorizations under Alternative 4 are less likely to indirectly disturb aquatic habitat than under Alternatives 1, 2 and 3, because Alternative 4 would designate only one utility corridor. Watershed disturbances would only slightly affect fish habitat by causing increased sedimentation and runoff, especially if construction disturbance is mitigated. The designation and later use of this single utility corridor are likely to slightly harm federally listed or common fish and aquatic wildlife and plants.

*Off-Highway Vehicle Management*
Impacts under Alternative 4 would be the same as under Alternative 1.

*Road Designations*
Road closures and restrictions under Alternative 4 would affect fish and aquatic wildlife and plants much as under Alternative 2.

*Recreation Management*
Recreation under Alternative 4 would affect fish and aquatic wildlife and plants much as under Alternative 2.

*Arizona Trail*
The Arizona Trail under Alternative 4 would affect fish and aquatic wildlife and plants much as under Alternative 2.

*Livestock Grazing*
Under Alternative 4, the crossing lanes for livestock management would no longer disturb 1,800 linear feet of aquatic habitat (less than 0.5 acre) **in the crossing lanes and up to 1.5 miles of aquatic habitat in the riparian watering areas**. Large numbers of cattle would no longer cross Cienega Creek and pose a small risk of injury to fish, frogs, garter snakes, and the Huachuca water umbel. Fish and aquatic wildlife and plants are expected to benefit only slightly more than under the other alternatives because most of Cienega Creek **(about 90%)** is already excluded from livestock grazing and the rest of the creek is scheduled to be fenced this year, **resulting in winter-use only in most of the other 10% of the creek.**

Most stock ponds would be retired or converted to wildlife use. To mitigate the probability of contamination of stock waters by illegal transplants of nonnative fishes and frogs by the public, water sources retained for wildlife or recreation use would still be supplied with water only seasonally and would be allowed to dry annually. These "repressos" would dry up naturally in one to three months after the pumping is stopped.

Upland vegetation management would promote a high level of channel stability, which would

enhance cienega-type riparian development. Upland vegetation management would reduce the prevalence of shrubs and increase watershed cover by promoting an increase in perennial grasses.

Without livestock grazing, ecological sites would likely meet their potential for plant community composition and production sooner and more often than with livestock grazing. All of the alternatives for grazing management are likely to promote habitat development with a diversity of conditions, including the following:

- High levels of instream cover.
- A large range of depths and velocities.
- Riparian canopy cover that ameliorates seasonal extremes in water temperatures.

Alternative 4 is likely to benefit habitat development with the least environmental risk of the problems of livestock control (e.g., fences and gates) and operator compliance (i.e., rotating pastures on time). But the gains on public lands are likely to be offset by reductions in watershed conditions from traditional grazing practices or large reductions in watershed conditions from conversion of private ranches and State Trust Land to urban development (see Impacts to Watersheds and Impacts to Wetland/Riparian Areas sections earlier in this chapter).

### From Special Designations

*Areas of Critical Environmental Concern*
ACEC management under Alternative 4 would affect fish and aquatic wildlife as under Alternative 2.

## Impacts to Terrestrial Wildlife (Including Threatened and Endangered Species)

**Scope of Analysis:** This section uses changes in habitat features and populations of terrestrial wildlife to compare the impacts of the alternatives on terrestrial wildlife.

## *Impacts to Terrestrial Wildlife from Alternative 1 (Current Management)*

### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*
Alternative 1 would make no concerted efforts to treat upland vegetation. In the long-term shrub cover would increase in the upland sites and perennial grasses would decrease. Some portion of open grassland communities would change over time to a mesquite/shrub woodland with grass understory. Less open grassland habitat would exist for grassland wildlife species (such as pronghorn, Baird's sparrow, scaled quail). Species that prefer more shrub and tree cover (e.g., white-tailed deer, mule deer, Gambel's quail, Cooper's hawk, Bell's vireo) would have more habitat.

*Fish and Wildlife Management*
Current fish and wildlife management includes: consultations with the U.S. Fish and Wildlife Service to reduce adverse impacts on endangered or threatened species, and coordination with the Arizona Game and Fish Department to minimize impacts to fish and wildlife from land use authorizations and projects.

Studies, habitat improvements, and reestablishing terrestrial wildlife could potentially improve the viability of wildlife populations and habitat values on public lands. For example, a study of pronghorn home range could document the amount of grassland habitat needed to sustain the local pronghorn herd. If applied, this knowledge could result in the acquisition from willing sellers--through purchase, easement, or other means--of more

grassland and could help maintain pronghorn herds in the planning area.

*Visual Resource Management (VRM)*
Alternative 1 would retain visual resource management (VRM) Class III for the planning area. This VRM classification is not expected to reduce the value or amount of upland habitats or reduce the viability of wildlife populations. Stipulations to ensure conformance with VRM Class III could slightly increase costs of habitat improvement projects.

*Cultural Resource Management*
Under Alternative 1, BLM would survey cultural resources as needed and stabilize or preserve historic buildings. Cultural resource survey, preservation, or stabilization would disturb about two acres of upland habitats in the planning area. This level of habitat disturbance would not noticeably reduce upland wildlife habitat use, habitat quality, or population viability.

**From Land Use Allocations**

*Mineral Development*
Under Alternative 1, a total of 458 acres of desert scrub, disclimax grassland, and oak woodland habitat in the Empire Mountains would remain open to locatable and leaseable mineral development. The entire area would be closed to salable mineral development. An unknown number of mines might be developed under Alternative 1. The extraction of locatable or leasable minerals would disturb the ground surface. Wildlife habitat loss and degradation would result from the following activities:

- Clearing vegetation and topsoil for pits, stockpiles, roads, ancillary facilities, storage sheds, offices, housing, parking, and loading areas.

- Excavating mineral materials, gravel, and rock.

- Stockpiling mineral material, ore, leaching piles, and overburden.

- Clearing habitat and installing trailers, storage areas, mills, equipment yards, material depots, refuse piles, fueling areas, and separation areas.

Mining of locatable or leasable minerals under Alternative 1 would degrade or eliminate an undetermined amount of oak woodland habitat for such species as Mearn's quail, white-tailed deer, and alligator lizard. Mining would also disturb some agave, which grows in scattered clumps in both woodland and grassland, and might harm the endangered lesser long-nosed bat, which feeds on nectar and pollen from agave blossoms.

The excavation, surface disturbance, and vehicle traffic from mineral development accidentally kill reptiles, especially slow-moving species such as western box turtles, rattlesnakes, and Gila monsters. This mortality could result in long-term declines in reptile populations when combined with mortality from disease and predation.

Under Alternative 1, mineral extraction would disrupt wildlife use. Mining often creates noise and dust and results in vehicle traffic and human presence, all of which scare away large wildlife species such as pronghorn, deer, and javelina. Ockenfels et al. (1994) found that pronghorn tend to avoid habitat within one kilometer (0.6 mile) of maintained roads. De Vos et al. (1984) found that mule deer avoid habitat within 400 meters (0.25 mile) of human intrusions. From these studies one can reasonably conclude that large ungulate species would avoid an area within a half mile or more of a mine.

Mine access roads would encourage increased incidents of poaching by improving access to a given area. Poaching can be a significant source of mortality and could lead to long-term

population declines, reducing the carrying capacity of otherwise suitable habitat. Impacts of poaching are described in more detail in the off-highway vehicle section below.

Alternative 1 would subject only a small portion of the planning area to the negative impacts discussed above. About 48,542 acres would remain closed to mineral development and would not be subjected to the above-mentioned impacts.

*Utility Rights-of-Way and Land Use Authorizations*

Alternative 1 would designate no right-of-way corridors within the planning area. As a result, utilities could propose rights-of-way for almost any area if the rights-of-way would not conflict with threatened or endangered species or sensitive cultural resources. BLM might grant rights-of-way that would significantly disturb wildlife over the long-term.

Construction along rights-of-way and at communication sites disturbs the ground surface and destroys native wildlife habitats. Surface disturbance allows for potential colonization by nonnative plants and animals, such as Lehmann's lovegrass, Johnson grass, starlings, and house sparrows. These species might out compete native plants and wildlife and reduce species diversity in the long-term.

Visitors tend to adopt rights-of-way and communication site roads as recreation travel routes. These roads also become areas accessible for poaching, off-road vehicle use, and other unauthorized activities. Such rights-of-way and land use authorizations could have impacts of the type described for mining roads and off-highway vehicles.

*Off-Highway Vehicle Management*

Alternative 1 would allow public motor vehicle use on ~~116.4~~ 113.2 miles of road. Throughout the planning area, levels of recreation use would be high and likely to harm wildlife and habitat.

Vehicle-based recreation disturbs wildlife. Such recreation often involves noise, vehicle traffic, and the presence of visitors and their dogs all of which scare large wildlife species, such as white-tailed deer and javelina away from the disturbed area. These species often reduce their use of an area surrounding recreational activities, especially those involving large numbers of people or pets.

Increased vehicle traffic (both authorized on-road use and unauthorized off-road use) would accidentally kill animals, especially slow-moving reptiles such as western box turtles, rattlesnakes, and Gila monsters, and other nongame species. When combined with death from other sources, such as disease and predation, this mortality could cause long-term declines in reptile populations.

Road access would also increase incidents of poaching. Roads increase the access to a given area and the likelihood of poaching. Large mammals are more easily poached, especially at night (Connolly ~~1981~~ 1991) and reptiles are more easily illegally collected in areas accessible by road. Brittell and Pierce (1984) found that almost 50% of mortality of radio-collared mountain lion was due to unregulated killing (including poaching) in Washington. Pursley (1977) estimated that the take of mule deer in New Mexico during closed season was 34,000, about the same as taken by legal harvest. This source of mortality could be significant and could lead to long-term population declines and reduce the carrying capacity of otherwise suitable habitat.

Unauthorized off-road travel by recreational users under Alternative 1 would disturb vegetation cover. Such users would leave

roadways to retrieve downed game, explore new areas, or gain access to hilltops for better views or campsites. Once one vehicle travels through an area, the tracks become a visible path for future use. Over time a new "wildcat" road becomes established in a previously roadless area. This process inevitably occurs where roads are present roughly in direct proportion to the level of recreation use.

The unauthorized off-road travel and resultant road establishment would disturb stands of agave, which grow in open grasslands. Vehicles driving over plants and compacting soil would reduce the density of these plants and indirectly harm the endangered lesser long-nosed bat, which feeds upon the nectar and pollen of the flowering agaves.

Other indirect impacts of the roads consist of human presence and vehicle traffic, which kill other nongame wildlife as well. This mortality can take several forms. All forms of wildlife, especially slow-moving species, such as western box turtles, rattlesnakes, and Gila monsters, can suffer mortality from accidental crushing by passing vehicles. Rattlesnakes and Gila monsters and other species are exposed to deliberate killing when found by motorists who fear or loath reptiles, especially venomous ones.

Some species of reptiles are considered valuable and captured for the illegal pet trade. This collection removes these individuals from the breeding population and constitutes effective, if not actual, mortality. Though not the problem of decades ago, hawks, vultures, and other protected avian species are still subject to shooting (Muth and Bowe 1998). These sources of mortality, all road related, could cause long-term declines in wildlife populations when combined with mortality from other sources such as disease and predation.

*Road Designations*

Alternative 1 would keep ~~116.4~~ 113.2 miles of road open to recreational use and impose only a few road closures or restrictions. High levels of recreation use throughout the planning area could be expected. The impacts would be as described in the off-highway vehicle designation section above.

*Recreation Management*

The lack of designation of recreation zones would result in dispersed recreation throughout the planning area. Because all-terrain vehicles and other off-road and four-wheel drive vehicles could access the entire area, the impacts would be as previously discussed in the off-highway vehicle designation section above.

Because BLM would build no designated camp areas or group sites, Alternative 1 would not have the impacts of concentrated use associated with such developments (which are discussed later for Alternatives 2, 3, and 4). Visitors would still engage in dispersed recreation throughout the planning area. The impacts of this dispersed recreation are described in the off-highway vehicle designation section above.

*Arizona Trail*

Alternative 1 would not designate a route for the Arizona Trail across the planning area and the trail would not affect wildlife resources.

*Livestock Grazing Management*

The vegetation consumed by livestock as forage represents a loss of potential cover and forage for wildlife in the planning area. Many factors influence the relative impact to wildlife species and habitats from this vegetation consumption. The amount of vegetation available **as useable forage** in any year is determined largely by rainfall amounts and patterns. Cattle can consume differing percentages of the ~~available~~ **useable** forage depending on many variables including: stocking rates, pasture rotation, season, and types of forage.

**The biological planning process which is used on the Empire-Cienega allotment, under current management, attempts to address these variations in vegetation production by making annual adjustments in stocking rates, employing flexible rotations, and addressing livestock-wildlife conflicts as they arise.**

Utilization is another important factor. Utilization **indirectly** relates to the vertical cover (height) of vegetation removed, but utilization is usually unevenly distributed across the landscape due to livestock movement patterns and preferences for certain areas. Utilization is usually **measured as** an average of the use in a pasture, and some areas in a pasture might have greater utilization than other areas. If livestock are on a rotational system and plants are grazed only once in a growing season, the plants can regrow after cattle are moved out, thereby ensuring cover would remain for watershed and wildlife. But repeatedly using plants in one growing season would affect the reserves the plant has for growth in the next growing season as well as the amount of standing cover that remains. When the nutritional value of forage is low, cattle might consume up to twice as much to obtain the nutrients they need (SCS 1976). **There has been a lack of certain types of monitoring data including utilization levels in pastures and measurements of standing cover for the allotments under Alternative 1, which has limited the effectiveness of the biological planning process to identify and resolve some of the grazing management issues.**

Another **potentially** important factor is the dietary overlap (similarity in plants consumed) among livestock and wildlife species. This overlap represents the degree of competition between cattle and wildlife for forage plants. Cattle often prefer certain species of plants over others and might reduce the relative abundance of preferred species in an area. **However, loss of wildlife cover from livestock grazing, rather than competition for specific forage species, has been the issue on the allotments in the planning area.**

Alternative 1 would permit livestock grazing on 41,855 acres of grassland and oak woodland habitats on public land. Since these cattle would graze on State Trust Lands or private lands during portions of the year, the number of livestock on public land at any one time would vary widely from 832 cattle (maximum allowable stocking rate on public land) to perhaps 400. If all allotments were stocked at the maximum allowable rate on public lands during a high rainfall year, livestock would consume 8 million pounds of forage, representing about 46% of the ~~available~~ **useable** forage on public land (See Chapter 2, Table 2-13). The same number of livestock would consume 68% of the ~~available~~ **useable** forage during a normal rainfall year and all ~~available~~ **useable** forage during a low rainfall year.

Under Alternative 1, livestock would graze 64,649 acres of grassland and woodland habitat on State Trust Lands. The maximum stocking rate on State Trust Lands in the planning area is 13,776 animal unit months (or 1,148 cattle per year). The 1,148 cattle would consume 11 million pounds of forage or 41% of the ~~available~~ **useable** forage on State Trust Lands during a high rainfall year. The same number of livestock would consume 61% of the ~~available~~ **useable** forage during a normal rainfall year and 92% of the ~~available~~ **useable** forage during a low rainfall year.

For all allotments and land ownership combined, the maximum stocking rate is 2,064 cattle, which would consume 19.8 million pounds of forage annually that represents 44% of the total ~~available~~ **useable** forage during a favorable year on allotments in the planning area. If livestock numbers were held at the maximum stocking rate during a normal rainfall year, livestock would consume 66% of the ~~available~~ **useable** forage. During an unfavorable

rainfall year, livestock held at the maximum stocking rate would consume 100% of the ~~available~~ useable forage. (Table 4-1)

**Table 4-1**
**Forage Consumed by Livestock on All Allotments in the Planning Area Under Three Rainfall Regimes**
**Alternative 1, Las Cienegas RMP**

| Rainfall Regime | Cattle Year-Long | Million Pounds of Forage Consumed/Year | % of Total Production Consumed | % of useable Forage Consumed (at 35% utilization limit) |
|---|---|---|---|---|
| High (Favorable) | 2,064 | 19.8 | 11 | 44 |
| Normal | 2,064 | 19.8 | 16 | 66 |
| Low (Unfavorable) | 2,064 | 19.8 | 24 | 100 |

But if livestock operators continue to adjust numbers on the Empire-Cienega allotment as they have done in the past, based on input from the Biological Planning Team, the percent ~~available~~ useable forage consumed would stay fairly constant on the allotment (See Chapter 2, Table 2-14). In a favorable year, 1,436 cattle on the Empire-Cienega allotment would consume 13.8 million pounds of forage, representing 41% of the ~~available~~ useable forage. In a normal year, 1,037 cattle would consume 10 million pounds of forage, representing 45% of the ~~available~~ useable forage. In an unfavorable year, 662 cattle would consume 6.4 million pounds of forage, representing 44% of the ~~available~~ useable forage. The variable stocking maintains a reserve of over one-half the useable forage in case of unexpected events such as wildfire. This reserve combined with one-half the total vegetation production which was initially left for rangeland health as watershed cover should ensure that the basic needs of the resource are being met. Less than 25% of the total production is being used for livestock forage. Because the Empire-Cienega allotment represents 68% of the planning area's grazed acreage, adjustments in stocking rate on this allotment significantly affect overall stocking rates and corresponding vegetation conditions in the planning area.

Tables 2-13, 2-14, and 4-1 represent a simplified model of the relationship of forage production and livestock consumption and assume that forage consumption by livestock is at a relatively constant rate under all conditions. The actual relationships are more complex, but the tables were developed to provide for comparison of the different grazing strategies: across alternatives.

These figures account only for the vegetation consumed by livestock. Trampling would also reduce vegetation cover. Livestock usually trample areas around reservoirs, springs, creek crossings, corrals, and other sites where they concentrate. The acreage of trampled habitat around each watering point can vary, but a zone of overuse of 1/4 mile radius around each water is a conservative estimate. Using the formula for calculating the area of a circle ($\pi$ times radius squared ($\pi r^2$ ) or 3.141 x 0.06 ) each watering point would result in 0.2 $mi^2$ of disturbance or about 122 acres of heavily

disturbed ground. For 30 earthen reservoirs, trampling would disturb 3,660 acres (5.7 $mi^2$) spread out over the allotments.

Livestock grazing could affect wildlife more during years of below-normal rainfall (six times between 1988 and 1997). The degree of impacts depend on the timing and extent of reductions in livestock numbers during drought. The impact of livestock grazing could be less during years of above-normal precipitation (three times between 1988 and 1997 as measured at the Empire west pasture Agricultural Research Service rain gauge).

Under Alternative 1, livestock would graze most grassland habitats, reducing cover or forage for grassland wildlife species such as Baird's sparrow, pronghorn, and grasshopper sparrow. If more than 50% ground cover is removed, which could occur at the upper end of current utilization limit of 40-60%, habitat conditions would improve for species that benefit from increased bare ground, such as horned larks, jackrabbits, and meadow larks.

The standing cover (stubble height) is an important factor for many of the grassland species, **including pronghorn and grassland sparrows for which sub-objectives were developed.** Measures of livestock use by percent utilization by weight fail to adequately measure standing cover and, under current management, **these or other** standing cover measurements **have not been made. Except on the Empire-Cienega allotment, upland vegetation data has not been regularly collected and the biological planning process has not been used. Continued declines in pronghorn numbers indicate the need to collect additional monitoring data to better determine the factors leading to their decline in the planning area.**

Livestock would also graze most oak woodland habitats, reducing habitat components, mainly cover, for such species as Mearn's quail, white-tailed deer, and bunchgrass lizard.

Studies have found that the density of bunchgrass lizards is up to 10 times higher in ungrazed than in grazed areas (Bock et al. 1990). Ballinger and Congdon (1996) documented the elimination of bunchgrass lizard populations in severe cases of grazing. Although heavy grazing can increase *Oxalis* sp. (a plant whose bulbs are preferred by Mearn's quail), livestock grazing that removes more than 55% by weight of ~~available~~ **useable** forage can eliminate local quail populations (Brown, R. 1982). Livestock utilization of 46-50% by weight appears to create habitat conditions that are marginal for maintaining quail populations. This utilization could occur in some areas under the current utilization limit of 40-60%.

Studies in the nearby Santa Rita Mountains showed that white-tailed deer use declined steadily with increasing livestock utilization (Brown, M. 1984). In most vegetation associations, deer use (as measured by pellet group counts) declined to near zero as Brown's "cattle index" (the square root of the cattle fecal count) approached 18. This decline might be due to forage competition, shifts in plant composition, or some combination of the two factors caused by livestock grazing. Although only a minor part of white-tailed deer diet, grass is a major cover component.

In another study, heavy livestock grazing before fawning reduced cover for newborn fawns and could increase vulnerability to predation (Ockenfels et al. 1991). Heavy use by large numbers of livestock, combined with lower than normal rainfall, would probably result in poor physical condition of does and in reduced reproduction (Smith 1984). Continuing current livestock management where stocking rates are varied in response to annual vegetation production and vigor would tend to reduce these impacts. **However, the current allowable**

**utilization rate of 40-60% may result in heavy livestock use in some areas.**

Some livestock would consume growing agave stalks found in scattered clumps in both woodlands and grasslands under Alternative 1. Agave are a major food source for the lesser long-nosed bat. On the Empire-Cienega allotment the variability of the grazing system varies the degree of this impact. Mature agave, which flower only once, produce flower stalks in the spring and early summer. In the early stages the growth points, which are highly edible, are accessible to grazing animals. Livestock mainly graze the loamy hills (the main ecological sites producing agave) in winter before agave produce stalks or in late summer after stalks have grown to an inaccessible height. During the spring, most livestock on the Empire-Cienega allotment usually graze the loamy bottom ecological sites (sacaton bottoms with few agave), greatly reducing their consumption of agave growth points.

But during spring livestock operations often use the loamy hills as bull pastures, so bulls may be grazing stalks on these ecological sites. The U.S. Fish and Wildlife Service Biological Opinion for the Cienega Creek Interim Grazing Plan lists studies of livestock use of agave as a nonbinding conservation recommendation (FWS 1996). Under current management with minimal monitoring, BLM has not begun or proposed this study.

Under current management, BLM has excluded **about** 659 acres of Cienega Creek and Empire Gulch from livestock grazing, including most riparian areas on public land. The Riparian Area Condition and Evaluation (RACE) monitoring completed in 2000 found about 12.5 miles of the riparian area in satisfactory condition and 1.6 miles in unsatisfactory condition (See Chapter 3, Riparian **and Wetland** Area Conditions). Cattle still have access to small amounts of riparian area at crossing lanes **(2.7% of total riparian area)** and in watering areas along Cienega Creek **(8.6 % of total riparian area) including at the Narrows along Cienega Creek during the winter**, and in portions of Empire Gulch, Gardner Canyon, Cinco Ponds, and at Nogales Springs.

The remainder of Cienega Creek is scheduled to be fenced from livestock except for six ~~existing~~ crossing lanes that include about ~~four~~ **8.3** acres of riparian habitat **and in winter-use watering areas of about 26 acres.** In these areas, cattle would forage on riparian vegetation, consuming and trampling seedling trees and shrubs. The result would be a loss of cover and structural diversity of woody riparian trees in small areas **(less than 10% of total riparian area).**

Suitable habitat for the endangered willow flycatcher is present in Cienega Creek (See Chapter 3, **Threatened, Endangered, and** Special Status Species section). ~~No nesting flycatchers have been recorded in the area, but the area has not been thoroughly surveyed.~~ **In 2001, an adult willow flycatcher feeding a fledgling near a willow flycatcher nest was found along Cienega Creek during willow flycatcher surveys. Use of** the crossing lanes and other areas open to grazing might fragment the habitat and affect its suitability for Southwestern willow flycatcher. Use of the lanes as described above could degrade about ~~four~~ **8.3** acres of suitable habitat within or next to the crossing lanes. **However, the willow flycatcher nest was located just upstream of a livestock crossing lane. Continued monitoring and a larger sample size of flycatcher nests would be needed to better understand the impacts of crossing lane use on flycatchers and their habitat.**

Within 2-3 years of excluding livestock from the previously grazed riparian areas, suitable willow-flycatcher habitat is generally created. But over time, areas excluded from grazing for several years also lose habitat potential as the trees begin to age. Density of cover in the 1- to

6-foot height declines as the Goodding willow and Fremont cottonwoods age. Disturbance, such as periodic floods and historical wildfires opened up these areas and created new habitat patches. With wildfires suppressed, more active management might be needed to maintain extensive areas of suitable habitat in this relatively stable system.

Some of the 14 planned livestock developments (stock ponds) would be placed within four miles of riparian areas. These facilities provide improved foraging habitat (in the form of bare ground with manure and weed seeds) for mourning doves, starlings, house sparrows, and brown-headed cowbirds. The brown-headed cowbird is a nest parasite of the Southwestern willow flycatcher, Bell's vireo, yellow warbler, and other song birds. **Potential for** cowbird nest parasitism of the Southwestern willow flycatcher and other species might increase due to the proposed waters next to Cienega Creek. Cowbirds have been shown to fly up to four miles from feeding areas to engage in nest parasitism (Robinson et al. 1995). Cowbirds would likely be present in the planning area regardless of livestock grazing on public lands because of the closeness of residential areas and horse facilities on private land. **However, no studies or monitoring have been conducted to determine relative cowbird numbers and whether nest parasitism is occurring and, if so, to what extent.**

Most roads in the planning area were originally built and maintained to service livestock management facilities (e.g., wells, pumps, corrals, fences, housing for ranch workers, and other facilities). These roads are also open to the public and are used by visitors. The impacts on wildlife from use of these roads have previously been described under off-highway vehicle impacts and impacts of roads for mineral development.

Alternative 1 proposes 21.5 miles of fence for livestock control. This fencing should not restrict movement of pronghorn, mule deer, and white-tailed deer, particularly, deer fawns because BLM fences are designed to allow passage by these species.

Decisions on livestock management and stocking rates for the Empire-Cienega allotment (the planning area's largest) have been made and would continue to be made with input from a Biological Planning Team under Alternative 1. Current levels of vegetation and watershed monitoring and analysis would continue under this alternative. BLM has conducted limited monitoring and analysis of wildlife species and habitat components (mainly for grassland sparrow habitat and endangered species) and would continue to do so.

The biological planning process has been used on the Empire-Cienega allotment since 1994 and has produced many changes in the management of the livestock operation. The grazing permittee first proposed this process and has voluntarily implemented almost all recommendations developed through it, including the following:

- Leaving more cover for sparrows and pronghorn, which use grassland sites on the south end of the ranch.
- Fencing most of the riparian habitat along Cienega Creek, Mattie Canyon, and Empire Gulch.
- Pumping water for pronghorn and other wildlife.

**Some of the improvements in ecological conditions which have resulted at least in part from these management changes include bringing the majority of riparian areas into proper functioning condition, expansion of wetland areas in the floodplain of Cienega Creek, expansion in length of perennial water in Empire Gulch, expansion of pool habitats for**

**Gila chub and Gila topminnow along Cienega Creek, and, most recently, successful nesting by willow flycatchers along Cienega Creek.**

The ability of the Biological Planning Team, under Alternative 1, to recommend effective livestock management changes that benefitwildlife is constrained by the limited amount of monitoring data being collected and the need to integrate the impacts of other resource uses. **It has been and would continue to be difficult to determine the effectiveness of management changes, particularly on wildlife species, made as a result of the current biological planning process without increased levels of monitoring.**

**From Special Designations**

*Areas of Critical Environmental Concern*
Alternative 1 would designate no areas of critical environmental concern. Hence, the impacts of grazing, mining, recreation, rights-of-way, vegetation treatments, and fire management on wildlife would be the same as those described in the preceding Alternative 1 impact discussions.

### *Cumulative Impacts–Alternative 1 on Terrestrial Wildlife*

Species inhabiting oak woodland habitats, such as Mearn's quail, white-tailed deer, and bunchgrass lizard, would be subject to similar pressures from increased development and management on surrounding and intermixed lands. Unlike pronghorn, white-tailed deer are somewhat compatible with high levels of human disturbance and would probably persist over the long-term.

Increased development and management on surrounding and intermixed lands would constrict and eventually cut off movement corridors between mountain ranges, harming wide-ranging species such as jaguar, mountain lion, black bear, and Gould's turkey, and dispersing individuals of other species such as bobcat, coati, and porcupine. Black bear, for example, might at first be attracted to humans because of refuse, bird food, and pet food. As these human-bear encounters increase from nuisance to dangerous levels, bears would be subject to lethal controls or removal. Such actions might reduce populations and eliminate bears from portions of their former range. This process has occurred recently in the Huachuca and Santa Catalina Mountains, where humans are rapidly encroaching.

Under Alternative 1, the Southwestern willow flycatcher would continue to use the riparian habitat along Cienega Creek during migration **and possibly during breeding**. This area has been documented as an important migratory stopover for many neotropical migratory bird species (Krueper 2000). ~~Although none have been documented as breeding within the planning area, willow flycatchers are highly opportunistic. Birds breeding 40-50 miles away could colonize the area (Krueper 2000).~~ **In 2001, an adult willow flycatcher feeding a fledgling near a willow flycatcher nest was found along Cienega Creek during willow flycatcher surveys. Continued monitoring in future years is needed to determine if flycatchers continue to use Cienega Creek for breeding and if use expands.**

Under Alternative 1, the likelihood of achieving the wildlife objectives would not be high because sufficient movement corridors might not remain to permit the maintenance of biological diversity desired in the objective. The high levels of human use likely under this alternative might increase the difficulty of successful recovery and reestablishing of species. Maintaining viability of priority wildlife species populations would also not be certain.

Several adjustments in livestock management might also be needed to maintain the levels of vegetation cover desired in the objectives. Without monitoring data to support these adjustments, the needed modifications might never be made.

## *Impacts to Terrestrial Wildlife from Alternative 2*

### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*

~~Activity plans for~~ Alternatives 2, 3, and 4 prescribe integrated vegetation treatment for the Empire-Cienega and Empirita allotments to reduce the density of mesquite, sandpaper bush, catclaw, burroweed, and shrub species. Vegetation treatments would affect wildlife in both the short- and long-terms.

Areas treated with prescribed fire would temporarily lose vegetation cover and, therefore, habitat for species previously occupying the area. Fire would also kill some wildlife, particularly slow-moving species such as reptiles.

Pronghorn might benefit temporarily from new growth following prescribed fire if these fires burn in the southern portion of the Empire Ranch. Prescribed fires in the northern portion of the Empire Ranch or in the Empirita Ranch would not benefit pronghorn, because the topography in those areas is too eroded and rugged to support this species. Prescribed fire would destroy some agave. BLM would consult with the U.S. Fish and Wildlife Service (under Section 7 of the Endangered Species Act) for any project-level prescribed fire plans which adversely affect listed species or critical habitat.

If any goats or sheep were used for biological control, they would compete for forage with mule deer and white-tailed deer (BLM 1991). Habitat quality for ungulates (hoofed mammals) could decline.

It is uncertain to what extent vegetation treatments would restore desired grassland communities. In some areas, enough topsoil may not remain to permit native grasses to recolonize to densities of a climax grassland community, especially on limey slopes and uplands. Control of dense mesquite stands on the Santa Rita Experimental Range did **not** significantly increase perennial grasses (McCormick 1975). Research by W. Whitford in New Mexico also suggests that mesquite colonization is largely irreversible (Cordery 2000). The ecological chain of events that led to mesquite invasion in the Southwest is complex (Pinkava 1999). Mesquite is a native plant, well adapted to the region, and cattle are major consumers of mesquite pods and dispersers of seed (Pinkava 1999).

The decrease in mesquite and shrub cover on the 20,000 **or more** treatment acres, resulting from the combination of vegetation treatments, would reduce occupation of treated areas by species that favor dense cover usually found in mesquite or desert shrub habitat. Cover would decline for such species as bunchgrass lizard, desert spiny lizard, Abert's towhee, Bell's vireo, Lucy's warbler, and Cooper's hawk. Use of the treated areas by dove, Gambel's quail, cottontail, mule deer, and white-tailed deer would decrease (BLM 1991).

These treatments would tend to favor species that prefer open habitats. Such species include vesper sparrow, Cassin's sparrow (BLM 1991), horned larks, and meadow larks. Species such as Baird's sparrow and grasshopper sparrow would benefit from conversion to more open grassland habitat. But grazing rest must be long enough (at least two years) to allow for

significant increases in native grass cover (BLM 1991). If nonnative species (such as Lehmann lovegrass) increase as a result of the treatments, then Baird's sparrow and grasshopper sparrow would not benefit.

The removal of livestock from most of the riparian area of Cienega Creek and its tributaries has improved riparian conditions and allowed most areas to return to proper functioning condition (See Chapter 3, Riparian and Wetland Area Condition). Localized impacts from cattle crossing lanes and watering areas would continue to include the following:

- Soil compaction of stream banks.
- Reduced stream bank cover.
- Reduced tree and shrub density.
- Reduced wildlife species diversity at watering areas and other sites where grazing is allowed as described under Alternative 1.

Limiting livestock grazing in riparian zones or using livestock grazing in riparian areas as a management tool would affect wildlife and wildlife habitat. Time lags in detecting the overuse of these areas could result in unacceptable levels of impacts. Impacts in acres of riparian habitat, stream miles, or the degree of wildlife impacts would depend upon the specific project proposal. BLM would complete environmental analyses for projects and consult with the U.S. Fish and Wildlife Service for any projects that might affect federally listed or proposed species or critical habitat.

BLM would reduce the loss of riparian vegetation and wildlife cover, especially for riparian birds, by the following actions:

- Restricting motor vehicles to designated crossings.
- Limiting camping.
- Prohibiting gold panning.
- Banning wood cutting.
- Limiting range and recreation developments.

Most of the riparian zone along Cienega Creek is in satisfactory condition with stream bank stability above 75%. Ensuring that activities do not cause bank stability to drop below 90% would improve the protection of riparian areas and wildlife habitats.

Through the biological planning process and by applying the Arizona Standards for Rangeland Health and Guidelines for Grazing Administration, BLM could analyze proposed activities and recommend how to eliminate these impacts. If these recommendations are followed, then stream bank stability would not decline and no riparian habitat would be lost.

Potential positive impacts include small improvements in stream bank cover on specific sites. The nature and degree of impacts on wildlife habitat and species would depend upon the proposals and actions related to these measures.

*Fish and Wildlife Management*

The impacts of proposals to consider reintroductions, range extensions, and supplementing populations of selected wildlife species (e.g., aplomado falcon, Gould's turkey, beaver, black-tailed prairie dog, pronghorn) would depend on the following:

- Results of habitat suitability assessments
- Public input
- Agency commitment

- Funding availability

- Other factors

Enough quality habitat might not exist to support viable populations of some of these species within the planning area. Some species, such as Gould's turkey, might require movement corridors to nearby mountain ranges. The constriction of these movement routes by human intrusion and development might greatly curtail the planning area's ability to support this species. Public attitudes might be hostile to reestablishing species extirpated due to conflicts with agriculture, such as the prairie dog. Hence we cannot now adequately analyze the impact of this measure. Populations could be reestablished or expanded to benefit the wildlife species in question only if all of the following conditions are met:

- Evaluations and public attitudes are positive.

- Habitat quality and quantity are suitable.

- Special needs of a given species (such as for movement corridors and migration resting points) are met.

- Needed funding can be obtained.

- Agencies cooperate.

Not enough quality habitat might exist on public land to support a viable pronghorn population over the long-term. Until this habitat is evaluated, we cannot evaluate the impact of this measure. Pronghorn herds have been known to persist in spite of human intrusions (Ockenfels et al. 1994). Habitat can be suddenly lost due to constraints in movement routes between core habitat areas. Such a loss is suspected to have occurred already in the Sonoita area where new homes and fences are being built. Managing for a mosaic of priority habitats could improve habitat for pronghorn, Baird's sparrow, grasshopper sparrow, Botteri's sparrow, and other terrestrial species. Potentially, habitat values could increase on public lands for species that depend on the priority habitat. If habitat does not improve, monitoring could provide clues as to corrective actions. BLM could then act to create the desired mosaic.

If it fully implements all actions proposed for pronghorn, BLM might be able to maintain a small but viable population of pronghorn on public land.

Actions to improve wildlife habitat by reducing habitat fragmentation would benefit wildlife. Enough actions might provide movement or dispersal corridors between the Santa Rita and Whetstone Mountains for large mammals including: mountain lion, black bear, white-tailed deer, and other wide-ranging species. From time to time, Gould's turkey might be able to travel along riparian corridors and use woodland habitats in the planning area.

But these efforts might not succeed with increased recreation. The creation of the off-highway vehicle (OHV) staging area and designated OHV trail along Oak Tree Canyon on national forest lands to the west of the planning area have increased human activity. Because ungulates and other wide-ranging wildlife tend to avoid the noise and disturbance created where many vehicles and visitors gather, Oak Tree Canyon is probably no longer suitable as a wildlife movement corridor.

### *Visual Resource Management*

**Under Alternatives 2, 3, and 4, BLM would designate visual resource management (VRM) Class II for public lands within the planning area. This VRM classification is not expected to reduce the value or amount of upland habitats or reduce the viability of wildlife populations.**

**Stipulations to ensure conformance with VRM Class II could slightly increase costs of habitat improvement projects compared with costs of conforming to VRM Class III under Alternative 1.**

*Cultural Resource Management*
Cultural resource management, mostly centered on the Empire Ranch headquarters, would slightly harm wildlife. More intensive use of the headquarters area could scare off large wildlife species, such as white-tailed deer and javelina. The area's planning and development would need to be sensitive to wildlife along Empire Gulch. Empire Gulch has high densities of nesting raptors and is often used by a variety ofnongame and big game. The headquarters area could focus educational and interpretative themes on these and other wildlife. Such themes could increase public awareness of the planning area's wildlife issues.

**From Land Use Allocations**

*Mineral Development*
Under Alternative 2, no locatable or leasable mineral extraction would disturb the surface and none of the mineral development impacts described for Alternative 1 should occur. Lack of mineral development would benefit the grassland or oak woodland habitats and associated species, such as Baird's sparrow, pronghorn, grasshopper sparrow, bunchgrass lizard, Mearn's quail, white-tailed deer, and alligator lizard. Mineral extraction would not disturb agave or affect the lesser long-nosed bat, which forages on nectar and pollen from agave blossoms. By closing the remainder of the planning area to mining, Alternative 2 would not affect wildlife activity patterns, and impacts from new access routes described for Alternative 1 would not occur.

*Utility Rights-of-Way and Land Use Authorizations*
Alternative 2 would designate two rights-of-way along preexisting routes. Developing rights-of-way would somewhat reduce cover for wildlife. Clearing wildlife cover to install towers, access roads, and construction staging areas would reduce the cover of trees, shrubs, and grasses near the route. Vegetation cover might not return to its previous condition because recreation users typically adopt these routes for travel and the right-of-way holder would periodically clear vegetation during right-of-way maintenance. Wildlife cover would decline on 180 acres.

Stands of agave, the plant that provides nectar and pollen for the lesser long-nosed bat, could grow in the path of new utility lines. Clearing of the utility lines could locally reduce agave density and affect this bat species. But BLM could stipulate avoidance of agave during the building of a utility line and enforce avoidance through the permitting process. Sometimes agaves can be replanted outside the path of construction to reduce losses.

The impacts of other land use authorizations would depend upon the nature and extent of the land use. No analysis can be performed at this time, but analysis would need to be done in site-specific environmental assessments.

The impacts of roads, which invariably occupy rights-of-way, have been discussed in previous sections on mineral development and off-highway vehicle management. These impacts, including vegetation loss, wildlife disturbance, poaching, and other wildlife deaths related to vehicles, would be somewhat less under Alternative 2 than under Alternative 1.

*Off-Highway Vehicle Management*
Limiting vehicles to designated roads would reduce road-related wildlife harm which is discussed under Alternative 1. Visitor use to the Empire-Cienega Planning Area might increase under Alternatives 2, 3, and 4 due to the following actions:

- Promoting and enhancing motor vehicle access.
- Acquiring rights-of-way.
- Designating and maintaining roads and trails.
- Identifying access.
- Converting some motorized routes to nonmotorized routes to create a mix of routes.

Because more people would use the planning area for motorized travel and other forms of recreation, the following indirect impacts to wildlife are expected:

- Vehicle-based recreation would disturb wildlife as described for Alternative 1 but over a smaller area because Alternative 2 would close more roads than would Alternative 1 and convert other roads to nonmotorized use, as described below.
- Implementing a designated road system would increase authorized on-road traffic and decrease unauthorized off-road traffic. More vehicles on roads might increase the accidental killing of reptiles, especially slow-moving species such as western box turtles, rattlesnakes, and Gila monsters. When combined with deaths from other sources such as disease and predators, these deaths could cause long-term declines in reptile populations.
- Improved road access in some areas would increase poaching, allowing poachers to more easily take large mammals and illegally collect reptiles in areas accessible by road. This source of mortality could lead to long-term population declines and reduce the effective carrying capacity of otherwise suitable habitat. But proposed road closures and restrictions might offset these increases.
- Implementing a designated road system would reduce the disturbance of vegetation cover by allowing BLM to more easily detect and close unauthorized or wildcat roads. Impacts of unauthorized off-road travel have been described for Alternative 1.
- The actions to improve access might foster an increase in recreation use along riparian areas, favored as picnic and camping sites by vehicle-based users. Recreation would reduce tree, shrub, and herbaceous cover for about 1/4 mile up and downstream from each access point. Loss of plants would decrease cover for riparian birds and might harm the Southwestern willow flycatcher. Proposed camping restrictions in riparian areas and closure of most riparian road crossings would reduce the potential for these impacts.

*Road Designations*

Alternative 2 would limit motor vehicle use to designated roads and keep ~~93.9~~ 91.9 miles of road open to recreational use. BLM would modify recreation use on ~~34.6~~ 35.3 miles of road by designating them for administrative use only or by converting them to non-motorized trails. BLM would close and rehabilitate ~~16~~ 13.7 miles of road, representing ~~2~~ 10% of the planning area's total road network on public lands. Alternative 2 would result in a high level of recreation use throughout the planning area. Closing roads would reduce impacts to wildlife, but converting roads to trail use or designating roads for administrative use is not likely to greatly alter impacts to wildlife.

The closing of ~~14~~ 10% of the road network would reduce vehicle-related wildlife impacts described for Alternative 1. Unless travel increases dramatically on roads that are open, wildlife traffic deaths might be lower than under Alternative 1 due to road closures and restrictions. Less road access would also slightly reduce opportunities for poaching. Road closures and restrictions, coupled with the

designated road system, would reduce opportunities for unauthorized off-road travel and allow BLM to more easily detect and enforce unauthorized travel.

In grassland habitat, pronghorn would benefit from the seasonal closure of Road Canyon to vehicles. But increased use of South Road between Highway 82 and Road Canyon might increasingly disturb pronghorn. Vehicle-based recreation would also curtail the use of Oak Tree Canyon as a movement and dispersal corridor.

Alternative 2 might cause slightly less disturbance to agave stands and slightly less soil compaction than would Alternative 1 and slightly less affect the agave plant, which provides an important food source (nectar and pollen) for the endangered lesser long-nosed bat during migration.

Under Alternative 2, BLM would close to vehicle use all but one riparian road crossing **perennial section of** ~~on~~ Cienega Creek. The impact to vegetation and wildlife would be about 40% less under Alternative 2 than under Alternative 1. Alternative 2 would also slightly less affect the Southwestern willow flycatcher than would Alternative 1.

### *Recreation Management*

Designating recreation zones would slightly affect upland wildlife under Alternative 2. These designations relate to recreation opportunities and involve access, road conditions, developments, and quality of experience. Most of the planning area would be designated Zone 3, which is close to existing conditions. Therefore, zone prescriptions under Alternative 2 would not greatly alter the impacts of recreation discussed in previous sections. Since all-terrain vehicles, off-highway vehicles, and other four-wheel drive vehicles can accessall zones, the impacts from motor travel would be as previously discussed and would not change from one zone to another.

In Zone 1, recreational impacts from camping would cease because camping would not be permitted. Developing the ranch headquarters and increased vehicle use on the entrance road could have moderate to high effects on wildlife. These effects would include vehicle impacts, as described in the off-highway vehicle section above, and disturbance and displacement of wildlife in response to increased activity.

In Zone 2, recreational impacts from camping and group use would be concentrated in designated areas rather than dispersed throughout the zone. Zone 2 would consist of about 7% of the planning area. This amount would be a slight improvement from Alternative 1, which proposes no recreation zones.

In Zone 3 (44,387 acres), BLM would not restrict camping to designated areas and would allow dispersed camping. Recreational use would be more diffuse, and impacts would be the same as under Alternative 1 for 90% of the planning area.

Under ~~the activity plans for~~ Alternatives 2, 3, and 4, the following impacts would be expected from the recreation ~~proposals~~ **management actions**:

- Establishing a permit system could directly, indirectly, or cumulatively affect wildlife or wildlife habitat. The permit system could help ensure that visitor levels are consistent with sustaining wildlife habitats and populations.

- A fee program option could benefit wildlife by providing funding to mitigate recreation impacts on wildlife. The fee program could also deter some visitors from using the area in the short-term. In the long-term, gradual acceptance of a fee system would probably no longer depress visitation levels.

- Acquiring a special land use permit from the Arizona State Land Department would have slight direct, indirect, or cumulative impacts on wildlife or wildlife habitat.

- Developing an interpretive and educational plan would have slight direct, indirect, or cumulative impacts on wildlife or wildlife habitat. Wildlife-related education might have a slight, beneficial, indirect impact. Some people might voluntarily curtail detrimental activities in response to knowledge gained from BLM's education efforts.

- Developing a recreation maintenance plan would not directly, indirectly, or cumulatively affect wildlife or wildlife habitat. But maintenance activities could temporarily displace wildlife species, or result in localized short-term disturbance or loss of habitat.

~~The activity plan for~~ Alternative 2 **management actions** would have several impacts. Designating three group sites and five designated camping areas would increase trampling, fuel wood cutting, clearing, and loss of vegetation cover in these areas within Zone 2. Designations would cause recreation impacts to concentrate around each site. At these sites, species such as Mearn's quail, Baird's sparrow, grasshopper sparrow, and other birds that prefer high percentages of native grass and forb cover would decline in number. Because of high levels of activity by visitors and pets, ungulates and other large species would tend to avoid these areas. Pronghorn use, for example, near the southern group sites or camp areas would be expected
to decline.

Establishing permanent group sites and designated camp areas would increase human refuse and food waste if visitors do not adhere to Leave No Trace principles. Any substantial levels of refuse and waste would attract colonization by nonnative birds such as starlings and house sparrows. These birds could out compete native cavity-nesting birds (e.g., acorn woodpecker, American kestrel, ash-throated flycatcher) in and around these sites causing local declines in native bird species. Any substantial increases in human refuse in and around designated camp areas would increase food sources for deer mice, house mice, and native scavengers, such as the striped skunk and common raven. The coyote, a generalist predator/scavenger, would benefit from increased rodent numbers and increased refuse (a food source).

The above mentioned impacts might be less when organized groups use the sites. Typically, these groups would abide by BLM stipulations and clean up most refuse. To do otherwise could result in cancellation of their permit and exclusion from future use.

Soil compaction at these sites would increase bare ground, which would favor such wildlife species as horned lark, cowbird, and Brewer's blackbird.

*Arizona Trail*

Under Alternative 2, a total of 11.6 miles of new trail would be built most within ½ to ¼ mile of existing roads. Four miles would be built close to the riparian zones of Empire Gulch and Cienega Creek. The remainder would be built in upland habitats.

Trail building would disturb some surface and destroy vegetation. These effects are discussed in the off-road vehicle management and road designation sections of Alternative 1 Impacts to **Terrestrial** Wildlife. Trail building and use might trample or reduce some stands of agave. Because of the trail's closeness to existing roads, where the degree of disturbance to wildlife and habitat is already high, the increase in recreational disturbance to wildlife would be less than under Alternative 1.

Because of the closeness of the Arizona Trail to riparian habitats, it is inevitable that considerable recreational activity would occur in the riparian zone because of the shade and reduced temperature afforded within the tree canopy. Recreational camping would inevitably reduce some vegetation cover despite restrictions on camping in riparian areas, trail riding along the stream banks, and activity in the stream itself. Recreation would also disturb breeding birds and their habitat. This loss of cover and disturbance could affect the Southwestern willow flycatcher, ~~if it breeds in the area in the future~~ by the following: Frightening birds away from nests.

- Trampling vegetation cover that shelters birds from the elements.

- Cutting or breaking down trees that harbor nests or resting cover.

The trail would increase horse use, bare ground, and seed-bearing manure along the riparian area. These changes could improve foraging conditions for the brown-headed cowbird. They might also lead to increased opportunities for nest parasitism and reduced breeding success for the Southwestern willow flycatcher and other breeding birds, including the yellow-billed cuckoo, yellow warbler, and Bell's vireo under high levels of use.

As the Arizona Trail becomes publicized and widely known, more visitors would use the area. Hence the effects of human disturbance to wildlife and habitat under Alternative 2 would be greater than under Alternative 1, which would not designate a route for the trail.

*Livestock Grazing*

Under Alternative 2, livestock would graze 42,155 acres of grassland and oak woodland habitats on public lands. This area is 300 acres more than under Alternative 1. The remaining 3,919 acres would be contained within exclosures.

Because Alternative 2 proposes a totally flexible stocking rate and cattle would graze State Trust Lands or private lands during portions of the year, the number of livestock on public land at any one time would vary widely. According to the examples of a flexible stocking rate that could be implemented for Alternative 2 under different rainfall regimes (See Chapter 2, Tables 2-21, 2-22, and 2-23), the stocking rate on public lands could vary from 861 cattle year long to 349 cattle year long. Over a year with high rainfall, for example, an amount of livestock use equal to 10,332 animal unit months (or 861 cattle per year) would occur on public lands. Table ~~4-1~~ **4-2** (compiled from information in Tables 2-21, 2-22, and 2-23) shows the amount of forage that livestock would consume on public lands under high, normal, and low rainfall regimes.

Under Alternative 2, livestock would graze 64,649 acres of grassland and woodland habitat on State Trust Land, the same amount as under Alternative 1. If stocking rates are as varied as they are on public lands based on input from the Biological Planning Team, from 519 to 1,209 cattle could be present on State Trust Lands. Table ~~4-2~~ **4-3** (compiled from information in Tables 2-21, 2-22, and 2-23) shows the amount of forage that livestock would consume on State Trust Lands under high, normal, and low rainfall regimes.

Table ~~4-3~~ **4-4** (compiled from information in Table 2-24) shows the amount of forage that livestock would consume for all allotments combined in the high, normal, and low rainfall regimes under Alternative 2. As under Alternative 1, adjustments in livestock numbers would result in the percent of ~~available~~ **useable** forage consumed remaining fairly constant, **leaving an adequate reserve of forage for unexpected events.**

Tables 4-2, 4-3, and 4-4 represent a simplified model of the relationship of forage production and livestock consumption and assume that forage consumption by livestock is at a relatively constant rate under all conditions. The actual relationships are more complex, but the tables were developed to provide for comparison of the different grazing strategies

**Table ~~4-1~~ 4-2**
**Forage Consumed by Livestock on Public Lands in the Planning Area**
**Under Three Rainfall Regimes**
**Alternative 2, Las Cienegas RMP**

| Rainfall Regime[1] | Cattle Year-Long | Million Pounds of Forage Consumed/Year | % of Total Production Consumed | % of ~~Available~~ Useable[2] Forage Consumed (at 35% utilization limit) |
|---|---|---|---|---|
| High (Favorable) | 861 | 8.3 | 11.8 | 67 |
| Normal | 520 | 5.0 | 10.7 | 61 |
| Low (Unfavorable) | 349 | 3.4 | 11.0 | 63 |

[1] The"favorable, normal, and unfavorable" years are mainly a reflection of rainfall. This variable is used to show that production varies greatly in response to the amount and timing of precipitation, and how different livestock stocking rates affect the amount of vegetation cover remaining to achieve the watershed and wildlife objectives in the plan. In a Favorable Year, the assumed average production is 1800 lbs/ac and 0 .25 AUM/ac on the Empire, Rose Tree, and Vera Earl ranches on the basis of NRCS Ecological Site Guides, and 1200 lbs/ac and 0.18 AUM/ac on the Empirita and Empire Mountain grazing units. In a Normal Year, the assumed average production is 1200 lbs/ac and 0.15 AUM/ac on the Empire, Rose Tree, and Vera Earl allotments based on NRCS Ecological Site Guides, and 800 lbs/ac and 0.12 AUM/ac on the Empirita and Empire Mountain grazing units. In an Unfavorable Year, the assumed average production is 800 lbs/ac and 0 .10 AUM/ac on the Empire, Rose Tree, and Vera Earl ranches on the basis of NRCS Ecological Site Guides, and 500 lbs/ac and 0.09 AUM/ac on the Empirita and Empire Mountain grazing units.

[2] In this example, the useable forage is assumed to be 50% of the total vegetation produced multiplied by the 35% utilization rate on lands allocated for livestock grazing. The formula for determining useable forage, where V is total vegetation production and U is useable forage is U = [(V x 0.50) x 0.35]. The percentage of allocated forage consumed remains fairly constant under this management strategy. (Note that the remaining 50% of the total production, that was subtracted initially is left to provide for rangeland health as cover left for watershed values). Thus in Table 4-1 in a favorable year, the useable forage represents only about 18% of the total vegetation production. Livestock consuming 67% of the useable forage are therefore consuming only about 11% of the total production.

**Table ~~4-2~~ 4-3**
**Forage Consumed by Livestock on State Trust Lands in the Planning Area**
**Under Three Rainfall Regimes**
**Alternative 2, Las Cienegas RMP**

| Rainfall Regime | Cattle Year-Long | Million Pounds of Forage Consumed/Year | % of Total Production Consumed | % of ~~Available~~ Useable Forage Consumed (at 35% utilization limit) |
|---|---|---|---|---|
| High (Favorable) | 1,209 | 11.6 | 10.9 | 62 |
| Normal | 750 | 7.2 | 10.2 | 58 |
| Low (Unfavorable) | 519 | 5.0 | 10.7 | 61 |

**Table ~~4-3~~ 4-4**
**Forage Consumed by Livestock on All Allotments in the Planning Area**
**Under Three Rainfall Regimes**
**Alternative 2, Las Cienegas RMP**

| Rainfall Regime | Cattle Year-Long | Million Pounds of Forage Consumed/Year | % of Total Production Consumed | % of ~~available~~ useable Forage Consumed (at 35% utilization limit) |
|---|---|---|---|---|
| High (Favorable) | 2,110 | 20.3 | 11 | 64 |
| Normal | 1,295 | 12.4 | 10 | 60 |
| Low (Unfavorable) | 887 | 8.5 | 10 | 62 |

across alternatives. Although the data in the tables is based on a simplified model, the tables illustrate the potential resource benefits of making adjustments in stocking rates based on resource conditions. These benefits include relatively constant reserves of vegetation production for watershed and wildlife values under varying levels of annual vegetation production.

Also, as under Alternative 1, trampling would reduce more vegetation cover. The loss of cover to trampling might be slightly higher or lower depending on the number of livestock present.This number would vary from year to year. But the impacts of concentrated use around stock tanks would be similar to those under Alternative 1, since these impacts have accrued over the years of use and do not change much in the short-term.

Under Alternative 2, operations could stock slightly more cattle (29) than under Alternative 1, ~~but on 300 more acres~~ but under this alternative actual stocking is based on monitoring of the actual forage produced the previous year, and on health of the plants, rather than on the opportunity to just stock numbers at the maximum allocated level. In normal and particularly unfavorable (low rainfall) years, the numbers stocked per acre ~~would probably track~~ should reflect the ~~available~~ actual useable forage, better than under Alternative 1 because the stocking rates would be based on more extensive monitoring data.

The potential for reduced cover and forage (based on the potential for livestock forage removal) for grassland wildlife species, such as Baird's sparrow, pronghorn, and grasshopper sparrow under Alternative 2 would stay about the same from year to year as the stocking rate is adjusted. The amount of cover removed under Alternative 2 could be slightly higher or lower than under Alternative 1, depending on the year and the amount of rainfall. This amount is difficult to determine because of the wide variability in potential livestock use.

The potential for reduced cover and forage (based on the potential for livestock forage removal) for oak woodland species, such as Mearn's quail, white-tailed deer, and bunchgrass lizard under Alternative 2 would stay about the same from year to year as the stocking rate is adjusted. The amount of cover removed under Alternative 2 could be slightly higher or lower than under Alternative 1, depending on the year and the amount of rainfall. This amount is difficult to determine

because of the wide variability in potential livestock use.

The potential for livestock to remove more than 55% by weight of ~~available~~ **useable** forage and reduce local Mearn's quail populations would be slightly less than under Alternative 1,because the allowable utilization range would have been lowered from 40-60% to 30-40%. Monitoring would be needed to ensure that utilization meets this range. The potential for livestock to affect the white-tailed deer's use of the habitat would also be slightly less than under Alternative 1, because of the lowered allowable utilization range.

The potential under Alternative 2 for livestock consumption of growing agave stalks would be slightly less than under Alternative 1. Some livestock (i.e., bulls) would still be present on ecological sites that support most agave populations when stalks are first bolting. If the Biological Planning Team recommends that the agave stand receive total rest from grazing and if the livestock users agree, the lesser long-nosed bat, which feeds on nectar and pollen from agave blossoms, would be less harmed than under Alternative 1.

Livestock grazing under Alternative 2 would affect the Southwestern willow flycatcher and other riparian birds less than under Alternative 1, **as upland water developments result in conversion of some watering areas along Cienega Creek to lanes**. An additional 520 acres of riparian areas would be excluded from livestock grazing, in addition to the 659 acres already excluded. Attracted to riparian areas by abundant forage, shade, and water, livestock would continue to consume and trample vegetation at watering points and livestock crossings as described for Alternative 1. ~~The addition of two~~ Livestock crossing lanes will disturb ~~an additional~~ **about the same** acre**age** of riparian vegetation.

Conditions created by livestock would continue to attract cowbirds. Cowbirds would continue to be present and have the potential to parasitize songbird nests, including those of willow flycatchers ~~(should this species attempt to nest in the area). No nesting flycatchers have been recorded in the area, but the area has not been thoroughly surveyed~~ **Only one flycatcher nest was located in the 2001 survey and it successfully fledged at least one flycatcher with no evidence of cowbird parasitism (BLM files). The sample size is too small to determine what effect cowbirds may have on nesting flycatchers in the planning area.**

Alternative 2 proposes exclosures for 2,740 more acres outside riparian zones. Exclosures might slightly but directly benefit upland species, particularly smaller species that could use the protected habitats and increased cover within them. Some of the exclosures would be too small and confining to directly benefit species with large ranges, such as pronghorn. But exclosures might have more substantial long-term indirect impacts for upland species from: (1) their use as comparison sites for a better understanding how grazing affects upland wildlife habitats, and (2) later management responses through the use of this information in the biological planning process.

Roads needed for livestock operations are provided within the existing road network under Alternative 1, as well as the designated road network under Alternative 2. BLM determined that no new roads would be needed, although Alternative 2 would designate some roads used for livestock operations for administrative use only. Therefore, Alternative 2 would result in no net change from Alternative 1 in disturbance from the use of these roads for livestock operations.

Despite the potential for slightly higher livestock use under Alternative 2 than under Alternative 1, the biological planning process

could increase population viability and habitat quality for some wildlife. In addition, it is a process for adjusting livestock grazing (and recreation use) to address and resolve issues that are raised for wildlife species. Monitoring for habitat and species would be more intensive than under Alternative 1, **as a result of implementing an ecological monitoring program** and might allow for more effective detection of habitat and population declines. The Biological Planning Team would use the monitoring data **as a basis for** changing management to try and reverse these declines. For example, if habitat conditions for pronghorn, Baird's sparrow, grasshopper sparrow, and Botteri's sparrow ~~continue to~~ declined despite the implementing of management actions, monitoring could provide clues as to further corrective actions.

The added monitoring of the biological planning process under Alternative 2 would help assess grazing (and recreation) impacts on selected species. Evidence of significant increases in habitat quality or in wildlife populations tied to changes in livestock management is lacking under current management due to limited monitoring data.

Existing data suggests that some wildlife populations (pronghorn and mule deer, for example) are in a state of prolonged decline throughout Arizona. The cause of this decline is ~~subject to speculation~~ **likely a result of a combination of factors including habitat loss from housing development; fragmentation of habitat by roads, fences, and other developments; and habitat alterations including invasion of shrubs. The AGFD is initiating a pronghorn study in 2002 which should help answer some of the management questions surrounding the pronghorn populations in this area. Habitat for some of the larger wildlife species such as these needs to be managed on a watershed or landscape scale. The emphasis on collaboration and partnerships in the watershed and on biological planning under Alternative 2 should aid in a more landscape-based approach to habitat management for these species.**

**From Special Designations**

*Areas of Critical Environmental Concern*
Alternative 2 would designate the entire planning area as an ACEC. Since the ACEC plan is the same as the ~~interdisciplinary activity~~ plan for Alternative 2, the management actions and their impacts on terrestrial wildlife are those discussed previously under impacts of Alternative 2 on terrestrial wildlife.

### *Cumulative Impacts–Alternative 2 on Terrestrial Wildlife*

Because of continuing economic pressure to subdivide and develop private land, much private land in and around Sonoita/Elgin is likely to be developed as residences and businesses, despite the BLM's collaborative efforts. Roads, fences, and human disturbance would still increase, especially near the southern and western edges of the planning area although perhaps less than under Alternative 1.

Under Alternative 2 some private land holders might decide to resist the economic incentive and continue ranching. Some adjacent undeveloped private lands, along with the public lands and State Trust Lands, would continue to provide habitat for grassland wildlife species such as grasshopper sparrow and Baird's sparrow. But invading nonnative birds found near human development and habitation, such as starlings and house sparrows, could still compete with wintering Baird's sparrows and breeding grasshopper sparrows. These species might be able to better coexist than under Alternative 1 because of the presence of undeveloped private lands.

The public lands in the planning area, along with some adjacent undeveloped, private lands, could become a refuge for many grassland

wildlife species such as grasshopper sparrow and Baird's sparrow.

High-quality pronghorn habitat on public land is limited within the planning area. Quality habitat on State Trust and private lands is important to the survival of the herd. Maintenance of a sustainable pronghorn herd would be doubtful, as under Alternative 1, because of human encroachment and changes in habitat quality on surrounding private lands (which are vital to pronghorn survival). Increased recreation use, domestic dogs, and other pressures would also restrict pronghorn from moving about and occupying otherwise suitable habitat.

These pressures would steadily increase and might eventually reach a level at which a self-sustaining pronghorn herd could not persist. For example, increased fences and homes have severely curtailed pronghorn movement from the Babocomari Ranch to public lands north of Elgin Road. These forces may have confined pronghorn to a 1,200-acre patch of public lands south of Highway 82.

Studies of pronghorn by Ockenfels et al. (1994) suggest that this patch might not ensure long-term viability of pronghorn unless movement corridors can be maintained or, in some cases, re-created. A viable herd might be maintained if cooperative private landowners preserve enough tracts of quality grassland habitat with movement corridors connecting them to public lands. Alternative 2 would be more likely than Alternative 1 to maintain such tracts, but Alternative 2 might not succeed.

Species inhabiting oak woodland habitats, such as Mearn's quail, white-tailed deer, and bunchgrass lizard, would be subject to less pressures on remaining public land than under Alternative 1. Unlike pronghorn, white-tailed deer are somewhat more compatible with high levels of human disturbance and would probably persist as under Alternative 1.

Despite actions proposed by Alternative 2, increased human occupation; fence construction; road building; and other alterations of habitat on private, State Trust, public, and national forest land would restrict important movement corridors. Wide-ranging species such as jaguar, mountain lion, black bear, mule deer, Gould's turkey, and coatimundi might have a few more movement corridors open to them under Alternative 2 than under Alternative 1, but human-wildlife encounters would continue to increase.

Under Alternative 2, the likelihood of achieving the wildlife objectives would still be doubtful, though less so than under Alternative 1. Enough movement corridors would be slightly more likely to remain under Alternative 2 than under Alternative 1 to permit the maintenance of biological diversity desired in the objective. As under Alternative 1, the high levels of human use likely under Alternative 2 would increase the difficulty of maintaining viable wildlife populations and successfully recovering and reestablishing species.

Upland species might still decline due to impacts outside public lands in the planning area. For example, Baird's sparrow, which migrate in summer, might decline due to habitat alterations on its summer range.

Several adjustments in livestock management might also be needed to maintain the levels of vegetation cover desired in the objectives. With enough monitoring data to support these adjustments, Alternative 2 might be more likely than Alternative 1 to make the modifications to achieve the desired vegetation objectives. But these vegetation objectives might not translate into population increases of priority species.

The vegetation treatment program, collaboratively implemented under Alternative 2, could improve habitat conditions for grassland species on public lands and

surrounding lands through cooperative projects. Under Alternative 2, the Southwestern willow flycatcher would continue to use the riparian habitat along Cienega Creek during migration and possibly breeding. This area has been documented as an important migratory stopover for many neotropical migratory bird species (Krueper 2000). In 2001, an adult willow flycatcher feeding a fledgling near a willow flycatcher nest was found along Cienega Creek during willow flycatcher surveys. Continued monitoring in future years is needed to determine if flycatchers continue to use Cienega Creek for breeding and if use expands. Excluding more riparian acres from livestock use than Alternative 1, Alternative 2 would present a slightly higher probability than Alternative 1 that Southwestern willow flycatchers would continue to nest in the area.

Under Alternative 2, livestock would consume some agave, and numbers of agave would decrease along rights-of-ways and roads, in prescribed fire units, and around recreation facilities. This loss of agave would negligibly affect the lesser long-nosed bat.

Under Alternatives 2, 3, and 4 the implementation of the proposed Las Cienegas Acquisition Strategy (Appendix 2) could result in the protection from development of significant tracts of State Trust and private lands within the planning area. If this occurs and is combined with the other management strategies under Alternative 2, then it will be much more likely that wildlife objectives are achieved, that more wildlife movement areas are preserved and that the viability of more fish and wildlife populations are assured over the longer term.

## *Impacts to Terrestrial Wildlife from Alternative 3*

### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*

Impacts under Alternative 3 would be the same as under Alternative 2.

### From Land Use Allocations

*Mineral Development*

Mineral development under Alternative 3 would affect wildlife and wildlife habitats much as would Alternative 1 but over a potentially much larger area. No estimate of disturbed acres is possible because there are no credible estimates of the number of mines and gravel pits that might be developed. The planning area might have limited potential for new mineral discoveries.

Clearing vegetation and topsoil for the pits, stockpiles, roads, ancillary facilities, storage sheds, offices, housing, parking, and loading areas would destroy and degrade wildlife habitat. Extracting locatable, salable, or leasable minerals would disturb the surface. The level of impacts described for Alternative 1 could be greater under Alternative 3, because Alternative 3 would open more acreage to mineral exploration and development.

Mineral extraction under Alternative 3 would disturb or degrade an undetermined amount of grassland habitat and directly disturb such grassland wildlife as Baird's sparrow, pronghorn, grasshopper sparrow, and bunchgrass lizard. Mineral extraction under Alternative 3 would also disturb an

undetermined amount of oak woodland habitats and eliminate or degrade habitat for such species as the Mearn's quail, white-tailed deer, and alligator lizard. Mining would disturb agave, which grows in scattered clumps in both woodland and grassland and might harm the lesser long-nosed bat, which feeds on nectar and pollen from agave blossoms.

Under Alternative 3, a total of 4,859 acres of riparian habitat within the Nogales Spring and Cienega Creek Areas of Critical Environmental Concern (ACECs) would not be subject to many of the impacts that could result from the mining of salable or locatable minerals. These ACECs would still be subject to many of the same impacts under leasable mineral exploration and development. But the development potential of such leasable minerals as oil, gas, and thermal energy is not known to be great.

*Utility Rights-of-Way and Land Use Authorizations*

The impacts of utility rights-of-way and land use authorizations on upland wildlife under Alternative 3 would be the same as under Alternative 2 with the following exception: An additional right-of-way corridor would parallel Highway 82 for underground utilities. Surface disturbance would result in loss of native grass species and potential for replacement with nonnative species, such as Johnson grass, Lehmann lovegrass, and Russian thistle. This loss would slightly reduce the suitability along the roadside for native birds, such as Baird's sparrow and grasshopper sparrow, but would improve habitat for nonnative species such as starlings and house sparrows.

*Off-Highway Vehicle Management*

Impacts would be the same as under Alternative 2.

*Road Designations*

Alternative 3 would convert ~~7.6~~ **6.8** miles of road to trails and close ~~11.4~~ **9.8** miles of road. The miles of closed roads would make up ~~8~~**7**% of the planning area's current road network on public land. These adjustments would not substantially alter the impacts discussed for road designations under Alternative 1.

*Recreation Management*

The designation of recreation zones under Alternative 3 would affect upland wildlife much as under Alternative 2. But Alternative 3 would include a greater area in Zone 2, where impacts of camping and group events would be restricted to designated sites. Under Alternative 3, Zone 2 would consist of nearly 17,000 acres, more than four times as large as Zone 2 under Alternative 2. Extensive, dispersed use would therefore disturb less wildlife, and localized concentrated use would inflict slightly more disturbance. Most of the area would still be in Zone 3, which would be similar to existing management in impacts to wildlife.

Alternative 3 would designate two additional group sites and one additional camp area than would Alternative 2. Therefore, the impacts of these concentrated use areas, as described for Alternative 2, would be extended to these additional areas. These additional areas are within grassland habitats and would most harm species inhabiting open grasslands.

Under Alternative 3, the two additional group sites would be in pronghorn habitat. Pronghorn tend to flee further from disturbance than other ungulates, so concentrated use areas more affect them. Pronghorn use near these sites would decline in response to the sites' occupation by visitors with pets.

*Arizona Trail*

Under Alternative 3, the Arizona Trail would affect terrestrial habitat and wildlife species the same as under Alternative 2.

*Livestock Grazing*

Under Alternative 3, livestock would graze ~~43,895~~ 45,375 acres of grassland and oak woodland habitats on public lands. BLM would permit livestock use equal to 5,832 animal unit months or 486 cattle per year on public lands in the planning area. This is less livestock use than would potentially occur under either Alternative 1 or 2 in normal and above-average rainfall years. At this stocking level, these animals would consume an average of 4 million pounds (dry weight) of vegetation material per year. The 486 cattle would be consuming 34% of ~~available~~ **useable** forage in a favorable (high rainfall) year, 52% of ~~available~~ **useable** forage in a normal rainfall year, and 78% of ~~available~~ **useable** forage in an unfavorable (low rainfall) year.

Under Alternative 3, livestock would graze 64,649 acres of grassland and woodland habitat on State Trust Land. Over the course of a year, an amount of livestock use equal to 7,932 animal unit months or 661 cattle per year would occur on State Trust Lands in the planning area (See Chapter 2, Table 2-28). This use would remove, on average, 6.3 million pounds of forage per year from State Trust Lands. The 661 cattle would be consuming 32% of ~~available~~ **useable** forage in a favorable (high rainfall) year, 48% of ~~available~~ **useable** forage in a normal rainfall year, and 72% of ~~available~~ **useable** forage in an unfavorable (low rainfall) year.

~~Available~~ **Useable** annual vegetation production would vary between 14 million and 33 million pounds on all allotments combined in the planning area. Livestock would consume an average of 11 million pounds of forage per year or between 34 and 78% of the ~~available~~ **useable** forage, depending on the production (**See Table 4-5** and Chapter 2, Table 2-29).

In a series of years with less than the mean annual rainfall, the goals and objectives in this plan for vegetation and wildlife would probably not be met, even with this conservative level of livestock grazing. In such a situation, BLM would not meet the standards required in the Arizona Standards for Rangeland Health and Guidelines for Grazing Administration (See Appendix 2). BLM would systematically implement and monitor the modification to the livestock grazing regime (including reduced numbers of cattle, until meeting the objectives. Since Alternative 3 would not apply the Biological Planning Team approach, this process of monitoring and adjustment could take several seasons before the livestock grazing is brought into balance with the capacity of the range and the rangeland standard is attained.

Under Alternative 3, livestock would graze most grassland habitats. Alternative 3 would result in potentially less loss of cover on public lands in most years (due to the lower livestock use levels) for grassland wildlife such as Baird's sparrow, pronghorn, and grasshopper sparrow than would Alternatives 1 or 2. Habitat conditions for species that prefer bare ground, such as horned larks, black-tailed jackrabbit, and meadow larks, would not increase much.

Livestock would graze most oak woodland habitats under Alternative 3, which in most years would have less potential than Alternative 1 or 2 to reduce habitat components (mainly cover) for such species as bunchgrass lizard, Mearn's quail, and white-tailed deer.

Under Alternative 3, livestock would consume slightly fewer growing agave stalks than under Alternatives 1 or 2 in most years due to the conservative stocking rate. But as under Alternatives 1 and 2, the impact on foraging habitat for the lesser long-nosed bat--which feeds on nectar and pollen from agave blossoms--is expected to be negligible.

Under Alternative 3, BLM would exclude 699 acres of Cienega Creek and Empire Gulch from

**Table 4-5**
**Forage Consumed by Livestock on All Allotments in the Planning Area**
**Under Three Rainfall Regimes**
**Alternative 3, Las Cienegas RMP**

| Rainfall Regime | Cattle Year-Long | Million Pounds of Forage Consumed/Year | % of Total Production Consumed | % of useable Forage Consumed (at 35% utilization limit) |
|---|---|---|---|---|
| High (Favorable) | 1,175 | 11.3 | 6 | 34 |
| Normal | 1,175 | 11.3 | 9 | 52 |
| Low (Unfavorable) | 1,175 | 11.3 | 14 | 78 |

livestock grazing. Cattle would still have access to small amounts of riparian area at livestock crossing lanes, and in portions of Empire Gulch, Gardner Canyon, Cinco Ponds, **and at Cienega Creek near the Narrows and in the A & B pastures north of the Agricultural Fields**. ~~and Nogales Spring~~. The impact of this livestock use on the Southwestern willow flycatcher and other riparian birds would be the same as under Alternative 2.

The impacts of the 14 planned livestock developments would be the same as described for Alternative 2.

Roads needed for livestock operations are provided within the existing road network under Alternative 1 and the designated road network under Alternatives 2 and 3. BLM found no new roads were needed, but would designate some roads used for livestock operations for administrative use only under Alternatives 2 and 3. Therefore, BLM expects no net change in disturbance from livestock operation use of these roads under Alternatives 1, 2, or 3.

Stocking rates under Alternative 3 (by applying BLM's standards and guidelines policy) would be adjusted more slowly than under Alternatives 1 or 2. But over the long term, livestock grazing management under Alternative 3 would achieve vegetation and wildlife habitat objectives.

**From Special Designations**

*Areas of Critical Environmental Concern*
Alternative 3 would designate two ACECs: Cienega Creek ACEC and Nogales Spring ACEC. Both consist of riparian areas, and their designation and management would not greatly affect upland wildlife. For analysis of the impacts of actions proposed under the ACEC plans for Cienega Creek and Nogales Springs, see Impacts to Terrestrial Wildlife from watershed, upland, and riparian actions under Alternative 2.

## *Cumulative Impacts to Terrestrial Wildlife from Alternative 3*

The cumulative impacts of Alternative 3 would be ~~the same as~~ **similar to those** under Alternative 1. However, **as under Alternative 2, the implementation of the proposed Las Cienegas Acquisition Strategy (Appendix 2) could result in the protection from development of significant tracts of State Trust and private lands within the planning area. If this occurs and is combined with the other management strategies under Alternative 3, then it will be more likely that wildlife objectives are achieved, that additional wildlife movement areas are preserved and that the viability of additional fish**

and wildlife populations are assured than under Alternative over the longer term.
~~The likelihood of achieving the wildlife objectives would also be about the same as under Alternative 1.~~

### *Impacts to Terrestrial Wildlife from Alternative 4*

#### From Desired Resource Conditions

*Watershed, Visual and Cultural Resources Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

*Fish and Wildlife Management*
The impact of wildlife management under Alternative 4 would be substantially the same as under Alternative 2. But the more restrictive management environment on public lands under Alternative 4 would greatly enhance the potential to maintain habitat quality, reduce habitat loss, and maintain viable wildlife populations on the 49,000 acres of public lands in the planning area. With less emphasis on collaboration, BLM could more quickly make management decisions. But BLM's limited potential for input on decisions for surrounding lands could have far-reaching impacts on wildlife. The impacts on the 120,000 acres of state and private lands could be substantial if these lands are developed and the areas are lost as habitat for many species (See Cumulative Impacts section below).

#### From Land Use Allocations

*Mineral Development*
Mineral development under Alternative 4 would affect wildlife the same as under Alternative 2.

*Utility Rights-of-Way and Land Use Authorizations*
Utility rights-of-way and land use authorizations under Alternative 4 would affect upland wildlife the same as under Alternative 2, except that rights-of-way would be limited to one designated corridor rather than two.

*Off-Highway Vehicle Management*
Impacts under Alternative 4 would be the same as under Alternative 2

*Road Designations*
Alternative 4 would designate ~~86.8~~ 83.9 miles of road for motorized recreation use, restrict ~~28.5~~ 30.2 miles of road to administrative use, and close and rehabilitate ~~27.6~~ 25.5 miles of roads. The road closures would represent ~~20~~ 19% of the planning area's road network on public lands. Therefore, impacts to wildlife from motorized recreation could greatly decline. By not converting roads to non-motorized trails, BLM would eliminate the potential of added impacts from nonmotorized recreation.

A high level of recreation use throughout the planning area can still be expected under Alternative 4, and impacts projected for Alternative 1 from motorized recreation (both authorized and unauthorized use) would still occur. Overall, the harm would be slightly less than under the other alternatives. Less vegetation cover would be lost. Agave stands might be slightly less disturbed and soil compaction slightly reduced from conditions under Alternative 1. Alternative 4 might also inflict slightly less harm on the endangered lesser long-nosed bat than would Alternative 1.

Under Alternative 4, BLM would close to vehicle use all but one riparian road crossing the perennial reaches of ~~on~~ Cienega Creek. The impact to vegetation and wildlife would be about 40% less under Alternative 4 than under Alternative 1. Motorized recreation under Alternative 4 would slightly less harm theSouthwestern willow flycatcher than under Alternative 1, but recreation would still somewhat affect bird species and nesting cover.

*Recreation Management*
The impacts on wildlife of designating recreation zones under Alternative 4 would not greatly differ from those under Alternative 2.

Alternative 4 would designate only one group site and four camp areas. Impacts from these concentrated use sites would be slightly less than under Alternative 2. But Alternative 4 would designate the most area in Zone 3, and impacts from dispersed recreation would be greater than under Alternatives 2 or 3 and the most like Alternative 1.

*Arizona Trail*
The impacts of the Arizona Trail on wildlife under Alternative 4 would be essentially the same as under Alternative 1, under which the Arizona Trail would not pass through the planning area.

Under Alternative 4, horse use is likely to increase along the riparian zone as a result of installing a nationally advertised trail. Increased bare ground and manure near the stream would increase potential for nest parasitism by cowbirds. Impacts to riparian birds, including the Southwestern willow flycatcher, would be as the same as under Alternative 2.

*Livestock Grazing*
Under Alternative 4, livestock would not graze 41,855 acres of public land that they now graze and livestock would not trample and reduce the vegetation cover on these acres. On average, 7 million more pounds of vegetation could be used for wildlife cover and forage needs on public lands than under Alternative 1; 3.4 to 8.3 million more pounds of vegetation than under Alternative 2, and 4 million more pounds of vegetation than under Alternative 3.

Under Alternative 4, livestock would still likely graze 64,649 acres of grassland and woodland habitat on State Trust Land. Over a year, an amount of livestock use equal to 13,776 animal unit months (or 1,148 cattle per year) would occur on these lands.

This livestock use would remove 6.3 million pounds of forage per year from State Trust Lands. If a series of years occurs with less than mean annual rainfall, livestock operators would decide how to adjust livestock use, with some input from the State Land Department. BLM would not contribute to decisions for stocking rates on State Trust Land since it would no longer hold state grazing leases.

Operators are likely to adjust livestock use in response to forage availability, range condition, and livestock nutritional needs. The need to reduce impacts to sensitive habitats or wildlife species would probably not greatly influence stocking rate decisions on State Trust Lands. The result might be less grass cover on State Trust Land for sensitive upland species during years of low rainfall.

The ungrazed vegetation would provide more cover on public land than under other alternatives for grassland wildlife, improving habitat for Baird's sparrow, pronghorn, and grasshopper sparrow, and for oak woodland species such as the Mearn's quail, white-tailed deer, and bunchgrass lizard.

Potential for cowbird nest parasitism of Southwestern willow flycatcher and other riparian species would slightly decrease from that under Alternatives 1, 2, or 3 because no livestock waters would be built close to the riparian area.

Cowbirds have been known to fly up to four miles from feeding areas to engage in nest parasitism (Robinson et al. 1995). An estimated 25 residences are on private land within four miles of the riparian area. Most of these have horses (five or more per residence) or other livestock that produce forage conditions

favorable for cowbirds. Hence, some parasitism is bound to occur under Alternative 4.

Riparian habitat under Alternative 4 would become less fragmented than under the other alternatives because no livestock crossings would be needed, and Southwestern willow flycatcher habitat would not be degraded by livestock use.

Alternative 4 would produce slightly more flowering agave stalks, providing nectar and pollen for the lesser long-nosed bat. Native ungulates (including pronghorn, deer, and javelina) would continue to consume agave stalks; thus, a percentage of stalks would fail to reach maturity.

The absence of livestock would reduce the need for some roads proposed for administrative use, under Alternatives 1, 2, and 3. BLM would close some of these roads for habitat restoration under Alternative 4 and maintain others for recreation use (see previous Road Designations section). Since livestock operators would no longer support road maintenance, some roads might decline in condition and be used less often. The result would be less road-related wildlife disturbance and mortality.

#### From Special Designations

*Areas of Critical Environmental Concern*
ACECs under Alternative 4 would have the same impacts as under Alternative 2.

### *Cumulative Impacts–Alternative 4 on Terrestrial Wildlife*

As under other alternatives, most larger upland wildlife species depend on habitats outside the planning area. Loss of habitat or reduction in habitat quality on nonpublic lands and lands outside the planning area could still result in habitat loss and population declines despite actions taken under Alternative 4 for the public lands.

Because pronghorn need large amounts of space, the increase in cover and forage under Alternative 4 might not be enough to offset the loss of pronghorn habitat to private land development. Land owners might be less inclined to preserve open space and maintain livestock operations on private land, as might be the case under Alternative 2. As under Alternative 1, the loss of grassland habitat on private lands could lessen the viability of the pronghorn herd when combined with recreation pressure on the planning area's public lands. As a result, the pronghorn herd might not be able to sustain itself on the remaining fragmented public land tracts.

The planning area would likely become the sole refuge for many grassland wildlife species, such as grasshopper sparrow and Baird's sparrow, if surrounding and intermixed private or State Trust lands are developed. Wintering Baird's sparrows and breeding grasshopper sparrows would be subjected to potential competition from invading nonnative birds, such as starlings and house sparrows, that are attracted by human development and habitation. But this competition would be less than under Alternative 1. Despite exotic competition, the native species would probably be able to coexist due to the excellent grass cover remaining on public lands.

Species inhabiting oak woodland habitats, such as Mearn's quail, white-tailed deer, and bunchgrass lizard, would be subject to similar pressures on the remaining public land. But because of increased amounts of available ground cover these pressures would be somewhat less than under Alternative 1. Unlike pronghorn, white-tailed deer are somewhat more compatible with high levels of human disturbance and would probably increase in numbers more than under Alternative 1.

Under Alternative 4, the Southwestern willow flycatcher would continue to use the riparian

habitat along Cienega Creek during migration and possibly breeding. In 2001, an adult willow flycatcher feeding a fledgling near a willow flycatcher nest was found along Cienega Creek during willow flycatcher surveys. Continued monitoring in future years is needed to determine if flycatchers continue to use Cienega Creek for breeding and if use expands. The suitability of the riparian area for nesting by Southwestern willow flycatcher would increase more than under Alternatives 1, 2, or 3, due to lowered potential for nest parasitism and reduced habitat fragmentation.

Under Alternative 4, livestock would not consume agaves, but agaves would somewhat decline along rights-of-ways and roads and around recreational facilities. This agave loss would negligibly affect foraging habitat for the lesser long-nosed bat.

Under Alternative 4, the likelihood of achieving the wildlife objectives would still be doubtful but less so than under Alternatives 1, 2, or 3. Movement corridors between mountain ranges would still likely be constricted and eventually cut off, harming wide-ranging species such as jaguar, mountain lion, and black bear.

The levels of human use would probably still be high under Alternative 4,and recreation would continue to affect wildlife. The removal of livestock from public lands and elimination of grazing conflicts might allow for more successful recovery and reestablishment of species. They might also permit maintenance of viable populations of more species than under Alternatives 1, 2, or 3.

Since no livestock would be grazed, sufficient levels of vegetation cover are likely to be maintained to achieve the objectives. BLM would still need to monitor the public lands to determine the effect of management on wildlife populations. But BLM might more quickly change its management than under Alternatives 1, 2, or 3 since livestock grazing would not be an issue.

As under Alternatives 2 and 3, the implementation of the proposed Las Cienegas Acquisition Strategy (Appendix 2) could result in the protection from development of significant tracts of State Trust and private lands within the planning area. If this occurs and is combined with the other management strategies under Alternative 4, then it will be much more likely that wildlife objectives are achieved, that more wildlife movement areas are preserved and that the viability of more fish and wildlife populations are assured over the longer term compared with the other alternatives.

## Impacts to Visual Resources

**Scope of Analysis:** This section uses changes in the quality of visual resource conditions in the viewshed, particularly from prime viewing areas, to compare the impacts of the alternatives on visual resources.

### *Impacts to Visual Resources from Alternative 1*

#### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*

Some older vegetation treatment projects (e.g., cut stumps and pulled trees), from an era before BLM management, slightly intrude on visual resources. Creek restoration projects can create short-term visual intrusions due to restoration work. Scenic values are maintained by using visually non-intrusive rocks and materials. For project sites with cut vegetation, heavy equipment tracks and other disturbances are naturalized within 1-3 years of completion.

*Fish and Wildlife Management*

Existing fish and wildlife management would continue to cumulatively enhance scenic values.

*Visual Resource Management (VRM)*
In general, the planning area retains a high scenic value under current management. Perceptions differ on what standards should be used to determine quality. A VRM Class III designation could slightly and cumulatively degrade visual quality, if BLM allows major visually intrusive projects without the more restrictive Class II designation.

*Cultural Resource Management*
Impacts from data recovery projects (i.e., archeological digs) are rare and do not significantly degrade high scenic values. If need be, areas can be naturalized or restored. BLM would develop the Empire Ranch headquarters to maximize viewsheds for visitors and to minimize added impacts from parking, access, and other facilities. BLM would keep the historical themes and settings during site design by using styles, colors, materials, and other architectural elements to reduce conflict.

**From Land Use Allocations**

*Mineral Development*
Any major mineral development on the "seen" viewshed of the planning area, especially the Empire Mountains, could degrade current high scenic quality. The social and political impacts of visual intrusions created by mining in the region's scenic areas are high. Impacts on visual resources could include: surface disturbance from road building, increased traffic, development of the mined site, and presence of equipment and structures.

*Utility Rights-of-Way and Land Use Authorizations*
Existing utility lines and developments requiring land use permits intrude on the quality of the visual resources, but they are not dominant features from the popular viewing areas. Random development and placement of new lines due to lack of designated corridors could increase the degrading of scenic values. Lines designed to be non-intrusive over the landscape would not have as great a negative impact as other lines.

*Off-Highway Vehicle Management*
Under existing management, the perpetuation of existing wildcat roads and the unauthorized creation of new roads can reduce scenic quality. Some barricade methods also intrude on the quality of visual resources.

*Recreation Management*
Lack of recreation zones would not directly degrade visual resources if management repairs current impacts. But having no established zones indirectly allows for continual spread of hardened campsites--continually used areas where the ground becomes bare, surrounding vegetation is damaged, and fire rings and trash are evident.

*Arizona Trail*
Without the development of the Arizona Trail, visitors might create social trails, which would slightly degrade visual resources.

*Livestock Grazing*
Many livestock developments, including water holes, power poles, wells, tanks, and corrals, are within view of the main touring roads and slightly reduce high scenic qualities.

**From Special Designations**

*Areas of Critical Environmental Concern*
Lack of ACEC designation under Alternative 1 might slightly reduce the resource protection emphasis that contributes to the planning area's visual quality.

## *Impacts to Visual Resources from Alternative 2*

### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*
Some vegetation enhancement projects under Alternative 2 might temporarily or permanently intrude on the stricter standards of a Class II VRM designation.

*Fish and Wildlife and Cultural Resources Management*
Under Alternative 2, projects would need to conform to Class II VRM class standards, or mitigation would be required.

*Visual Resource Management (VRM)*
VRM Class II is the same classification required in many wilderness areas, where fewer alterations to the landscape can be allowed. This classification would ensure the mitigation of visual impacts from past and future grazing and recreation developments, major vegetation treatments, and wildlife enhancement projects that create structures or alter the landscape, thereby, benefitting the visual landscape.

### From Land Use Allocations

*Mineral Development*
Because Alternative 2 would virtually eliminate opportunities for mineral development, mineral development would not degrade visual resources.

*Utility Rights-of-Way and Land Use Authorizations*
Establishing a corridor in areas that do not dominate the viewshed and in conformance with Class II VRM prescriptions should retain high scenic values. Establishing a corridor along the existing El Paso gas line would perpetuate the visual intrusion of the service road from certain view points. The corridor in the northeast is not viewed as often as the El Paso gas line corridor, and new development, if allowed, should not dominate the viewshed. If conforming to Class II prescriptions, the corridor should retain high scenic values.

*Off-Highway Vehicle Management*
Limiting motor vehicles to designated roads under Alternative 2 might reduce the perpetuation of wildcat roads and the potential for creating new wildcat roads and would thus benefit visual resources. Under road closures, the reduction in miles of roads could reduce some visual intrusions. But few, if any, of these roads affect the prime viewshed.

*Recreation Management*
Group sites, parking areas, and campsites prescribed in Zones 1 and 2 under Alternative 2 could become visual intrusions if they are placed in dominant viewsheds. The southern end of the Airstrip might become a dominant feature from a prime viewpoint (Road 900 and ranch headquarters), if not landscaped to reduce visual intrusions. Restricting camping within the main road corridors would enhance VRM values from prime viewing areas. Establishing a group site at the Airstrip might not conform to Class II standards, unless it is landscaped to a more natural appearance.

*Arizona Trail*
Trail placement in dominant viewsheds under Alternative 2 could slightly reduce scenic qualities.Livestock Grazing Under Alternative 2, some current livestock infrastructure might not conform to stricter Class II standards. Range improvements might also not adhere to designs that conform to stricter Class II standards.

### From Special Designations

*Areas of Critical Environmental Concern*
Designation of more ACECs under Alternative 2 might ensure compliance of Class II VRM designation.

## *Impacts to Visual Resources from Alternative 3*

### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 3 would be the same as under Alternative 2.

### From Land Use Allocations

*Mineral Development*
Mineral development outside ACECs under Alternative 3 would have similar types of impacts as under Alternative 1 but at a much greater scale. Potential mineral material sales outside the ACEC could slightly impair the viewshed, but would have to conform to Class II standards.

*Utility Rights-of-Way and Land Use Authorizations*
An added utility corridor (three versus two) under Alternative 3 would increase the potential for degrading visual resource management classes in other areas. Impacts could be mitigated. Buried utility lines could reduce visual impacts as long as the affected land is rehabilitated to conform to Class II designations. But buried lines are not feasible for all applications.

*Off-Highway Vehicle Management*
Impacts under Alternative 3 would be the same as under Alternative 2.

*Recreation Management*
Recreation Zone 2 under Alternative 3 could retain high VRM values because of limiting camping to a few designated campsites. Because Zone 2 would include the largest area under Alternative 3, this restriction might be more beneficial to visual resource values than restrictions under Alternative 2, which cover less area. Some Zone 2 developments, including some barricades and permanently altered areas for parking lots and campsites, might not conform to VRM Class II standards and would have to be mitigated. Zone 3 would have a tendency to receive more impacts to landscape because of the dispersed camping prescription. Zone 3 covers less area under Alternative 3 than under the other alternatives.

Permanent recreation use of the Airstrip would slightly mar the viewshed because the airstrip is in a prominent location and does not fit into Class II standards. Restoring and revegetating the southern end of the Airstrip instead of the northern end to camouflage proposed recreation development plans might be more suitable for retaining Class II standards.

*Arizona Trail*
Impacts under Alternative 3 would be similar to those under Alternative 2. Trail placement in the dominant viewshed could slightly reduce scenic qualities.

*Livestock Grazing*
Impacts under Alternative 3 would be the same as under Alternative 2.

### From Special Designation

*Areas of Critical Environmental Concern*
Impacts under Alternative 3 would be the same as under Alternative 2.

## *Impacts to Visual Resources from Alternative 4*

### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

**From Land Use Allocations**

*Mineral Development*
Impacts under Alternative 4 would be the same as under Alternative 2.

*Utility Rights-of-Way and Land Use Authorizations*
Impacts would be similar to those under Alternatives 2 and 3 but would have slightly less potential for visual intrusion under Alternative 4, which would designate only one corridor instead of two or three. The proposed corridor in the northeast corner of the planning area is generally not within prime viewshed. This corridor would be the preferable alternative for retaining the quality of the viewshed from prime viewing locations on Road 900 and at ranch headquarters.

*Off-Highway Vehicle Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

*Recreation Management*
The recreation zone configuration under Alternative 4 would have the most area in Zone 3. This area would receive more dispersed camping and would harm the viewshed slightly more from main viewing roads than would Alternatives 2 or 3. The partial use of the Airstrip could be reversed to the other end of the Airstrip to conform to VRM Class II.

*Arizona Trail*
The Alternative 4 proposal for the Arizona Trail would cause the least amount of added impacts to the existing viewshed, because the trail would be routed along existing roads. Using existing routes for the Arizona Trail would reduce potential adverse impacts to VRM critical vantage points

*Livestock Grazing*
Although livestock would no longer graze on public land, continuing cattle operations on intermixed and adjacent State Trust Lands could degrade VRM Class II values by creating the need for miles of new fence lines. Some cattle operation needs might also intrude on prime viewsheds on State Trust Lands. If BLM retains range developments for wildlife or recreation use after removing livestock, those developments would continue to intrude on visual resources.

**From Special Designations**

*Areas of Critical Environmental Concern*
Impacts under Alternative 4 would be the same as under Alternative 2.

## CULTURAL AND PALEONTOLOGICAL RESOURCES

### Impacts to Cultural and Paleontological Resources

**Scope of Analysis:** This section uses the potential for disturbance to or for increased protection of cultural and paleontological resources to compare the impacts of the alternatives on cultural and paleontological resources.

### *Impacts to Cultural and Paleontological Resources from Alternative 1 (Current Management)*

**From Desired Resource Conditions**

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*
Vegetation cover often helps to preserve archaeological sites by reducing and inhibiting soil erosion. Lack of integrated vegetation treatment in the planning area would eliminate a protective action from which most cultural resources could benefit.

*Fish and Wildlife Management*
Actions proposed for wildlife management under Alternative 1 would benefit cultural resources to a limited extent by limiting human and livestock disturbances.

*Visual Resource Management (VRM)*
Designating VRM Class III under Alternative 1 could allow some visual intrusion of the landscape surrounding the historic Empire Ranch headquarters. Such intrusions might include utility lines, roads, buildings, and other structures.

*Cultural Resource Management*
BLM would comply with National Historic Preservation Act mandates for preserving and treating the planning area's cultural resources. But limited funds and staff time might hamper or slow the work.

Accumulation of archaeological data would continue to be limited and would largely depend upon Class III inventories conducted on a project-by-project basis for small-scale projects and undertakings, such as building wildlife or livestock watering tanks or fences or occasional rerouting of a short stretch of road. A database to enable the meeting of the cultural resource objective would develop only very slowly over a long period. BLM would probably not conduct Class I and II cultural resource inventories unless it somehow acquires special funds or an occasional scientific project funded by a university research grant or other non-BLM entity. BLM would probably not accumulate the data needed to develop a well-rounded and complete cultural resource management program for the planning area. Additionally, BLM would probably not collect or present interpretive and educational materials useful to the public.

Under all alternatives, BLM would evaluate, stabilize, and manage historic properties under the Secretary of the Interior's Standards for National Register Eligible Sites. Under Alternative 1, BLM would continue to stabilize and preserve the Empire Ranch headquarters buildings, but the work would largely depend upon grants obtained through the Empire Ranch Foundation. The buildings would probably deteriorate faster than stabilization could be funded through the foundation or sporadically by BLM.

Limited funds and staff time would probably hamper or slow work on completing National Register forms for historic buildings (other than the Empire Ranch House, which is listed on the National Register). Alternative 1 would limit the scope of interpretive programs at the Empire Ranch headquarters and would not include the educational opportunities provided under Alternatives 2, 3, and 4.

**From Land Use Allocations**

*Mineral Development*
Under Alternative 1 keeping 48,542 acres of acquired public lands closed to locatable and leaseable mineral development and closing allpublic lands to salable mineral (discretionary) development would protect cultural and paleontological resources in those areas from mining disturbance. But mining could disturb some cultural and paleontological resources on ~~5,915~~ 7,167 acres of split-estate lands and 458 acres of original public domain in the Empire Mountains. Mining plans of operations could be designed to avoid cultural or paleontological sites or mitigate impacts through data recovery.

*Utility Rights-of-Way and Land Use Authorizations*
With an absence of designated utility corridors, construction and maintenance of randomly placed utility lines could disturb some cultural and paleontological sites. But utility lines could be designed to avoid sites, or data recovery could mitigate impacts.

*Off-Highway Vehicle Management*
The most serious threat to the planning area's cultural resources is posed by people illegally driving four-wheel-drive vehicles, all-terrain vehicles, and motorcycles off of roads. Vehicles can damage cultural sites by driving over them. Some people might also use these types of vehicles to drive into remote areas, where they illegally collect surface artifacts and vandalize and loot cultural sites. Protecting the planning area's cultural resources, while allowing recreational vehicle use in the area, would be a difficult task.

Under Alternative 1, limiting vehicles to the existing ~~116.4~~ 113.2 mile road network would continue impacts at several locations where roads cross cultural sites. Alternative 1 would also allow access to remote areas where sites are vulnerable to looting, vandalism, and illegal surface collecting. By not allowing the creation of random new roads, Alternative 1 would help protect some sites. Roads affecting sites could be rerouted to avoid causing further damage. Dirt or gravel pads could be laid on sections of roads crossing sites, to protect against further damage. If no other course is possible, BLM could close a road that is causing or allowing a site to be damaged. BLM would also close to public use roads providing access to sites being looted, vandalized, or subjected to illegal surface collection.

Designating ~~20.3~~ 21.1 miles of road for administrative use only would restrict public access into some areas where cultural sites are vulnerable to impacts. BLM would conduct Class III cultural resource surveys where roads are closed and reclaimed, as well as along roadways where such inventories have not been conducted. Where necessary and feasible, roads would be rerouted to avoid further site impacts, or data collection would be used to mitigate impacts.

*Recreation Management*
By not establishing recreation zones, Alternative 1 would encourage dispersed recreational uses that would disturb some cultural sites. Without zones, the irregular and unplanned uses by the public at the Empire Ranch headquarters would continue.

*Arizona Trail*
By not designating a corridor for the Arizona Trail, Alternative 1 would avoid direct cultural site impacts from trail building and associated cumulative impacts.

*Livestock Grazing*
Currently, livestock are fenced from areas where cultural site densities are high and are dispersed where site densities are low. BLM could erect protective fences around sites that livestock might disturb. No grazing in the Empire Mountains would encourage vegetation growth, which might reduce soil erosion at some sites. Class III cultural resource surveys would continue for all grazing improvements, such as livestock tanks and fences.

**From Special Designations**

*Areas of Critical Environmental Concern*
By not designating Cienega Creek and portions of Gardner Canyon, Empire Gulch, and Mattie Canyon as ACECs, Alternative 1 could preclude management prescriptions that might help preserve cultural resources in those areas.

## *Impacts to Cultural and Paleontological Resources from Alternative 2*

**From Desired Resource Conditions**

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*
Actions proposed for integrated vegetation treatment under Alternatives 2, 3, and 4 would benefit cultural and paleontological resources by increasing vegetation cover and reducing soil

erosion at many sites. BLM would conduct Class III surveys to find cultural and paleontological sites in all treatment areas and would design prescriptions to avoid or mitigate impacts.

Implementing the Fire Management Plan would reduce fuels around the buildings at the Empire Ranch headquarters and encourage growth of vegetation that would conserve soil at many cultural sites throughout the planning area. For prescribed burns, BLM would follow guidelines specified under "Requirements for Cultural Resource Inventory of Prescribed Burn Areas," Appendix 5, BLM Handbook H-8120.

*Fish and Wildlife Management*

Management for priority species and priority habitats would help preserve cultural resources. Actions proposed for fish and wildlife management under Alternatives 2, 3, and 4 would encourage preserving some cultural resources. BLM would conduct Class III surveys to find cultural sites in all treatment areas and design prescriptions to avoid or mitigate impacts.

*Visual Resource Management (VRM)*

Designating a Class II visual management area would help preserve cultural and paleontological resources by prohibiting physical disturbances at some cultural sites. This proposal would help preserve the visual integrity of the historic landscape around the Empire Ranch headquarters because Class II restricts changes to the existing character of the landscape more than VRM Class III under current management.

*Cultural Resource Management*

Under Alternative 2, the public and the scientific community would benefit from a wide array of educational, interpretive, and research uses at the Empire Ranch headquarters and sites outside the headquarters area. Adaptive reuse of the historic buildings would facilitate their preservation and allow both public and administrative uses. Use of partnership and volunteer labor would allow the public to participate in interesting and unique projects not generally offered elsewhere, while accomplishing tasks to comply with the National Historic Preservation Act and BLM objectives.

Scientific information accumulated from cultural resource inventories and data collection at sites outside the ranch headquarters would contribute knowledge toward understanding human use of the planning area during prehistoric and historic times. Such information would also be crucial to managing the planning area's cultural resources.

Under Alternatives 2, 3, and 4, local communities and residents would have a restored historic site at the Empire Ranch headquarters to represent their history and development and ranching's contribution to the area. Developing the ranch headquarters would give school groups an unusual, natural and cultural laboratory for studies. The headquarters would also allow students and teachers to intern, join hands-on programs, or conduct studies at the headquarters and planning area.

Under Alternatives 2, 3, and 4, visitors to the headquarters would have fully developed facilities with drinking water, restrooms, Americans with Disabilities Act access, shade, and communications. Alternatives 2, 3, and 4 would best meet the desired resource conditions for the headquarters by offering the public more programs while maintaining the historic properties.

**From Land Use Allocations**

*Mineral Development*

By essentially eliminating locatable and leasable mineral development in the planning area, Alternative 2 would protect the area's cultural

and paleontological resources from disturbances of mining.

~~The activity plans for~~ Alternatives 2, 3, and 4 **minerals management actions** would eliminate the earth disturbance of gold panning from areas where cultural sites might be harmed.

*Utility Rights-of-Way and Land Use Authorizations*

Designating two utility corridors across public land in the planning area could damage cultural and paleontological resources in those corridors. But utility lines could be designed to avoid disturbing cultural and paleontological sites, or impacts could be mitigated with data recovery.

Designating utility corridors would confine site impacts to specified linear areas and facilitate impact management, as opposed to widely dispersed impacts that might result with randomly placed corridors. Class III cultural resource inventories would be conducted within each right-of-way corridor and, where suitable, ensuring that treatment and mitigation prescriptions would be developed and implemented. Under Alternative 2, disturbance to cultural and paleontological sites would be more confined within the corridors than at multiple locations in the planning area.

*Off-Highway Vehicle Management*

Alternative 2 would limit motor vehicle use on 49,000 acres of public land to designated roads covering ~~93.9~~ 91.9 miles. But some cultural sites would remain vulnerable to impacts from motor vehicles. BLM would conduct Class III cultural resource surveys on existing and future road and trail routes and on roads to be closed and reclaimed. Information collected during these surveys would be used to develop plans for the following:

- Site avoidance or physical protection (dirt or gravel pad).
- Data recovery where roads and trails cannot avoid sites.
- Monitoring for all sites in or near trails and roads.

When needed, BLM could close roads and trails to protect sites. BLM would not create new roads or trails that might disturb or destroy cultural sites. Some areas with significant cultural properties and possible paleontological sites would remain accessible and would continue to have the potential for illegal surface collecting, vandalism, and looting.

*Recreation Management*

Designating recreation Zones 1, 2, and 3 could affect cultural and paleontological resources. In Zone 1, the Empire Ranch buildings would be preserved and interpreted for the public. Land surrounding the buildings would be surveyed at a Class III level and site impacts would be mitigated by data collection. BLM would manage the buildings and adjacent land according to requirements of the National Historic Preservation Act and the National Register of Historic Places. Designating and managing the headquarters as Zone 1 would benefit cultural and paleontological resources dispersed elsewhere because visitors and facilities would be concentrated at the headquarters. Certain types of visitors would confine all activities to the headquarters rather than the remaining planning area.

In Zone 2, corridors along Oak Tree Canyon and South Road would be surveyed at a Class III level. Data collection or recovery would mitigate impacts. BLM would routinely monitor and assess for mitigation needs the cultural properties and sites along these corridors.

In Zone 3, BLM would survey roads and trails at a Class III level and reroute or close them where they affect cultural sites. Data collection or

recovery could mitigate impacts. When needed, fees could be used to mitigate impacts caused by recreation use.

Under Alternatives 2, 3, and 4, a recreation permit system could be used to ensure that visitor levels remain compatible with protecting cultural resources, including the historic ranch headquarters. A fee program, if established as part of the permit system, would supplement objectives for educational and scientific use and preservation of the planning area's cultural and paleontological resources. Fees could also help pay for rehabilitation, maintenance, and adaptive reuse of the Empire Ranch headquarters buildings and also for stabilizing archaeological and paleontological sites throughout the planning area.

*Arizona Trail*
Under Alternative 2, designating a corridor for the Arizona Trail would disturb some cultural sites and could disturb some paleontological sites. The trail route would be surveyed at a Class III level and, where possible, routed to avoid sites. Data collection or recovery would mitigate any direct impacts from trail building and cumulative visitor use. BLM would routinely monitor sites along the trail to assess and mitigate impacts of trail use.

*Livestock Grazing*
Impacts from management of grazing on the Empire-Cienega, Empirita, Rose Tree, and Vera Earl allotments under Alternative 2 would be the same as under Alternative 1. BLM would design grazing management in new allotments in the Empire Mountains to disperse livestock and prevent their congregating where cultural properties might be located. BLM would conduct Class III cultural resource surveys before placing any range improvement structures, such as fences and livestock watering tanks. Such structures would be designed to avoid both direct and cumulative impacts. Exclosure fences could be built around cultural properties to protect them from livestock damage.

#### From Special Designations

*Areas of Critical Environmental Concern*
ACEC management in the planning area under Alternative 2 would emphasize protecting and enhancing soil, vegetation, and wildlife. Cultural and paleontological resources in an ACEC would benefit from these prescriptions through increased vegetation cover and reduced soil erosion.

### *Impacts to Cultural and Paleontological Resources from Alternative 3*

#### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 3 would be the same as under Alternative 2.

#### From Land Use Allocations

*Mineral Development*
Under Alternative 3, mining could disturb cultural and paleontological resources on 41,000 acres of public land open to mineral location and on 45,859 acres of public land open to mineral leasing. But mining would not disturb cultural and paleontological resources in ACECs. Mines could be designed to avoid some cultural and paleontological properties, and some disturbance could be mitigated with data recovery.

*Utility Rights-of-Way and Land Use Authorizations*
Impacts to cultural and paleontological resources from utility rights-of-way and land use authorizations under Alternative 3 would be the same as under Alternative 2. Potential impacts and avoidance or mitigation of impacts would apply as under Alternative 2, except that a third

utility corridor could disturb more cultural and paleontological sites. A Class III survey would be required on the rights-of-way along Highway 82. Data recovery would be required at all National Register eligible sites that the survey finds and that would be disturbed by installing utility lines.

*Off-Highway Vehicle Management*
Although the number of miles vary for road closures and restrictions, the impacts and avoidance and mitigation prescriptions under Alternative 3 would be the same as under Alternative 2.

*Recreation Management*
Management of uses and impacts to cultural and paleontological resources would be the same under Alternative 3 as under Alternative 2.

*Arizona Trail*
Impacts to cultural and paleontological resources from the Arizona Trail under Alternative 3 would be the same as under Alternative 2, except that under Alternative 3, the Arizona Trail would channel people into a narrow corridor having significant cultural resources, subjecting them to looting, vandalism, casual visitor impacts, and illegal surface collecting. Data accumulated by a Class III survey could aid in trail layout and design to avoid directly disturbing sites in this corridor. These sites would be vulnerable to increased levels of looting, vandalism, illegal surface collecting, and unauthorized visitation.

*Livestock Grazing*
Under Alternative 3, livestock grazing would affect cultural resources in the same manner as under Alternatives 1 and 2.

**From Special Designations**

*Areas of Critical Environmental Concern*
Under Alternative 3, management prescriptions to enhance soil, vegetation, and wildlife in the Cienega Creek and Nogales Springs ACECs would help protect archaeological sites against soil erosion. Cultural resources would benefit as they would under Alternative 2, because both ACEC proposals would protect riparian areas where cultural resources tend to be most prevalent.

## *Impacts to Cultural and Paleontological Resources from Alternative 4*

**From Desired Resource Conditions**

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

**From Land Use Allocations**

*Mineral Development*
Impacts under Alternative 4 would be the same as under Alternative 2.Utility Rights-of-Way and Land Use Authorizations
Potential impacts and avoidance or mitigation of impacts under Alternative 4 would be the same as under Alternatives 2 and 3. But under Alternative 4, potential impacts would be confined to sites in only one utility corridor.

*Off-Highway Vehicle Management*
Although the numbers of miles would vary for road closures and restrictions, the impacts, avoidance, and mitigation prescriptions under Alternative 4 would be the same as under Alternatives 2 and 3.

*Recreation Management*
Management of uses and impacts to cultural and paleontological resources would be the same under Alternative 4 as under Alternatives 2 and 3.

*Arizona Trail*
Under Alternative 4, designating eight miles of existing road as the Arizona Trail corridor

would disturb locations where roads now cross some cultural sites. BLM could reroute the trail to avoid sites, or mitigate impacts by data recovery.

*Livestock Grazing*
Exclusion of livestock from public lands in the planning area could both benefit and harm the area's cultural and paleontological resources. Eliminating livestock could enhance the growth of vegetation cover and reduce soil erosion at some cultural sites. But cumulative impacts on cultural resources could occur if ranches are subdivided or visitation to the area increases.

### *Cumulative Impacts--Cultural and Paleontological Resources*

Loss of grazing on public lands could result in the failure of adjacent and associated ranch businesses and in turn encourage the sale of adjacent State Trust and private land for residential development. Statistical data collected during the past decades from public land throughout the Southwest shows that illegal surface collecting, vandalism, and looting increase on public land sites as residential development occurs on adjacent and nearby private lands. This process would probably occur should State Trust and private land next to public land in the planning area be developed for residential use. Also, earth moving for residential development could disturb or obliterate significant prehistoric village sites and historic ranch and homestead sites. Such development might change natural drainage systems and cause flooding and loss of cultural sites through stream bank erosion.

Increasing tourism and recreation are trends being experienced in the watershed and beyond as Kartchner Caverns and other developments open. The spinoff effects of such visits to the planning area are unknown, but are expected to increase as visitors discover the area and as marketing promotes the Sonoita-Patagonia/Hwy. 82-83 loop. As visitation increases to the headquarters, visitation to surrounding communities such as Sonoita would also be likely to increase. Communities and local businesses would benefit economically from increased visitation.

## LAND USES

### Impacts to Lands and Realty Actions

**Scope of Analysis:** This section uses impacts on the ability to permit land use authorizations and provide services to compare the impacts of the alternatives on lands and realty actions.

### *Impacts to Lands and Realty Actions from All Alternatives*

#### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*
Lack of an integrated vegetation treatment program under Alternative 1 would not affect lands and realty actions. Under Alternatives 2, 3, and 4 proposed vegetation treatments, including prescribed fire, could affect existing and future utility right-of-way facilities. Mitigation measures would need to be adopted to avoid damaging facilities. In addition, applicants for utility right-of-way facilities must be aware of these mitigation measures for the proposed vegetation treatments and how these measures might affect their facilities.

Wildland fire management under all alternatives would help protect facilities from wildfires.

*Fish and Wildlife Management*
Under all alternatives, protecting threatened, endangered, and sensitive plants and animals could impede the installing of new right-of-way facilities or could increase development costs due to mitigation. BLM might have to require mitigation to avoid harm to priority species or

prevent jeopardizing the existence of endangered or proposed species. If a proposed right-of-way facility cannot be installed within the proposed right-of-way corridors without harming a priority species, an alternative right-of-way corridor might have to be selected for the proposed use. If the impacts could not be mitigated, BLM might have to deny the application.

Under all alternatives, proposals to remove or modify rights-of-way would be difficult and expensive for the holders and have significant adverse economic and social impacts. According to regulation 43 CFR 2800, the right-of-way holder can continue to renew its right-of-way under the original terms of the right-of-way grant. BLM cannot terminate a right-of-way grant unless: (1) the holder has violated the terms of the grant and refuses to correct the violation, or (2) the right-of-way is no longer needed. As possible mitigation, BLM could suggest to the holders that they modify and move their facilities. Then only with the holder's permission could BLM modify the right-of-way grant to reflect changes from the original right-of-way plan of development, terms, and stipulations.

Removing existing roads could harm right-of-way users who use the subject roads to gain access to their facilities. Mitigation would need to ensure that holders have another road for reaching and servicing their facilities.

Cumulative Impacts: The listing of more threatened and endangered species would further restrict site availabilities and options for land use and right-of-way authorizations.

*Visual Resource Management (VRM)*
Under all alternatives, BLM would consider visual resources in developing and analyzing rights-of-ways or other land use proposals. Designating public lands as VRM Class III under Alternative 1 would less restrict land use proposals than the more restrictive VRM Class II under Alternatives 2, 3, and 4. BLM would require mitigation to preserve existing visual resources; such preservation would increase development costs.

*Cultural Resource Management*
Under all alternatives, the discovery of any cultural sites could delay or preclude the installing of a right-of-way facility. Mitigation needed to avoid damaging the site would increase development costs. Should mitigation prohibit the installing of a new facility, an alternative right-of-way corridor would be used. Otherwise, BLM would have to deny the application.

**From Land Use Allocations**

*Mineral Development*
Any mineral development under Alternatives 1 or 3 would likely result in requests for utility rights-of-way or other land use permits to service the mining facilities. Opening up the most area to mining, Alternative 3 would be most likely to cause these impacts.

*Utility Rights-of-Way and Land Use Authorizations*
BLM ~~must be able to meet the needs and provide the services required by utility companies now and in the future.~~ **will attempt to meet the needs requested by utility companies provided that the services and needs are conducive and in accordance to federal laws, regulations and the goals and values of the Las Cienegas NCA, as set forth by congressional legislation.** The designated utility corridors within the planning area under Alternatives 2, 3, and 4 respond in varying degrees to the expected increase in future right-of-way requests, which would be driven by economic and social factors. With the deregulation of the utility industry increasing demands for more interstate and intrastate utility routes are likely. The increase of regional developments on adjacent private

lands, State Trust Lands, and neighboring cities outside the planning area would bring a need for the utility industry to accommodate consumer needs. The proliferation of utility routes crossing the public lands in the planning area might be attributed to the capacity restrictions on existing major utility corridors along Interstate 10 and through State Trust and Forest Service lands.

Once existing utility corridors reach their capacities, later utility routes would look more to using the designated corridors proposed in this plan. Alternative 4 would provide the fewest routing options with only one corridor. Alternative 2 would provide a moderate level of routing options with two corridors. Alternative 3 would provide the highest level of routing options with three corridors. Because the BLM-managed land crossed in these utility corridors is such a small percent of the total, the ability to obtain rights-of-ways across adjoining State Trust Lands might have more impact than obtaining rights-of-ways across public land.

*Off-Highway Vehicle Management*
Motor vehicle travel on utility easements or access routes under all alternatives might result in conflicts between users and utilities over damage to facilities and liability concerns.

*Road Designations*
Road closures and restrictions under Alternatives 1 and 3 would not affect lands and realty actions.

Under Alternatives 2 and 4 road closures might conflict with access routes used by utility rights-of-way holders and with proposed utility facilities. Proposed closures could be mitigated by not allowing the closing of any roads or trails used to access utility rights-of-way. BLM would need to grant administrative access for all authorized users. Fewer roads closed would impose fewer access restrictions on right-of-way holders.

*Recreation Management*
The designation of recreation zones would not affect lands and realty actions under any of the alternatives.

*Arizona Trail*
Under Alternatives 2, 3, and 4, the use of the Arizona Trail could conflict with access routes being used by utility right-of-way holders. Any new trails or roads built for the Arizona Trail could be mitigated by not allowing the trail to interfere with a right-of-way holder's facilities, maintenance, and access. Designating the Arizona Trail would require access authorization from El Paso Gas Company tocross its gas line property, which runs through public lands in the planning area.

*Livestock Grazing*
Livestock grazing management would not affect lands and realty actions under any of the alternatives.

**From Special Designations**

*Areas of Critical Environmental Concern*
ACEC designation would not affect lands and realty actions under Alternatives 1, 2, and 4. Designating an ACEC could conflict with the proposed right-of-way utility corridor and existing rights-of-way on public lands in two sections:

T.18 S., R. 17 E., Sec. 12
T.18 S., R. 18 E., Sec. 7

**Cumulative Impacts:** The ACEC designation for sensitive species and resources would more greatly restrict the availability of sites and allow fewer options for providing land use and right-of-way authorizations.

## Impacts to Mineral Development

**Scope of Analysis:** This section uses the acreage open to potential mineral exploration and development to compare the impacts of the alternatives on mineral development.

### *Impacts to Fluid Mineral Leasing*

#### *Impacts to Fluid Mineral Leasing from Alternative 1 (Current Management)*

The planning area contains lands that are prospectively valuable for oil and gas. This area represents about 5% of the land in southeast Arizona (Cochise, Eastern Pima, and Santa Cruz counties) that is prospectively valuable for oil and gas. About ~~48,542~~ **48,498** acres ~~(88%)~~ **(86.5%)** of BLM-managed land and mineral estate prospectively valuable for oil and gas are not open to mineral leasing under current management. The original public domain lands (458 acres) and split-estate lands (~~5,914.6~~ **7,167** acres) are open to fluid mineral leasing under current management. This acreage represents ~~12~~ **13.5%** of the public land mineral estate. BLM considers lease applications and permits to drill on a case-by-case basis. About 25,000 acres of the Cienega Basin that is prospectively valuable for oil and gas is open to fluid leasing on the State Trust Lands, which are managed by the Arizona State Land Department. Therefore, under current management, 40% of the Cienega Basin that is prospectively valuable for oil and gas is open to mineral leasing and 60% is closed.

#### *Cumulative Impacts--Alternative 1 on Fluid Mineral Leasing (Current Management)*

Cumulative impacts to the oil and gas industry are expected to be nominal given the limited interest in the basin during the past 60 years. Alternative 1 does not affect geothermal resources because the planning area is not prospectively valuable for geothermal energy.

#### *Impacts to Fluid Mineral Leasing from Alternative 2*

Alternative 2 would close split-estate and public domain lands to mineral leasing, increasing the planning area acreage closed to leasing by ~~6,373~~ **7,625** acres, a ~~12~~ **16**% increase from Alternative 1. A total of ~~54,915~~ **56,123** acres would be closed. As a result, 70% of the planning area that is prospectively valuable for oil and gas would be closed to fluid mineral leasing.

#### *Cumulative Impacts--Alternative 2 on Fluid Mineral Leasing*

Cumulative impacts under Alternative 2 would be the same as under Alternative 1.

#### *Impacts to Fluid Mineral Leasing from Alternative 3*

Under Alternative 3, a total of ~~51,774~~ **52,983** acres of public land and public mineral estate in the planning area would be open to fluid mineral leasing subject to standard lease terms and conditions. Only lands within the Appleton-Whittell Research Ranch (3,140 acres) would remain closed to mineral leasing. The area open to mineral leasing would increase by ~~45,401~~ **45,358** acres (~~84~~ **70%**) over current acreage (Alternative 1). About ~~77,000~~ **78,000** acres or 96% of the planning area that is prospectively valuable for oil and gas would be open to fluid mineral leasing.

Areas of critical environmental concern (ACECs) would be subject to no surface occupancy. Permittees would have to directionally drill to targets that might be located beneath the ACEC, increasing drilling costs.

#### *Cumulative Impacts--Alternative 3 on Fluid Mineral Leasing*

Alternative 3 would open the entire Cienega Basin to fluid mineral leasing, increasing the area in southeast Arizona that is prospectively valuable for oil and gas by about 5%. An

increase in exploration, however, is not expected in the foreseeable future.

### *Impacts to Fluid Mineral Leasing from Alternative 4*

Alternative 4 would affect fluid mineral development the same as would Alternative 2.

### ***Summary*** ~~***Overview***~~

Alternative 1 would help meet the goals and objectives for the planning area by limiting oil and gas exploration to a few scattered tracts of land throughout the planning area. Alternatives 2 and 4 would meet the goals and objectives more immediately by not allowing any oil and gas exploration within the planning area. Alternative 3 would not meet the goals and objectives in the short-term because oil and gas activity would disturb upland vegetation, upland wildlife, scenic beauty, and watershed health. Only in the long-term, after reclamation has erased the impacts, could the goals and objectives be maintained.

### *Impacts to Locatable Minerals*

### *Impacts to Locatable Mineral Development from Alternative 1 (Current Management)*

Under current management all acquired public lands (~~48,542~~ **48,498** acres) are closed to mineral location. This acreage represents ~~88~~ **86.5**% of the federal mineral estate in the planning area. This closure prohibits mineral exploration in more than 33% of the planning area. About ~~5,900~~ **7,167** acres of split-estate lands and 458 acres of public lands in the Empire Mountains ~~(12~~ **(13.5**% of the federal mineral estate in the planning area) are open to mineral location. State Trust Lands are also open to mineral exploration and development as authorized by the State of Arizona. Therefore, 65% of the planning area is open to mining either on federal mining claims or state leases.

### *Impacts to Locatable Mineral Development from Alternative 2*

Alternative 2 would close all public lands and split-estate lands to mineral location, removing ~~6,373~~ **7,625** more acres of land from locatable mineral exploration, a ~~12~~ **13.5**% increase in closed area from current management (Alternative 1). Limiting mineral exploration to State Trust Lands would prevent exploration for high-purity limestone on the southeast side of the Empire Mountains and also prevent exploration for copper in 40% of the planning area. The one known deposit of limestone on federal lands within the planning area is under mining claims owned by the Georgia Marble Company. Therefore, the right to mine the deposit would be protected unless Georgia Marble drops the claims.

### *Cumulative Impacts--Alternative 2 on Locatable Mineral Development*

Several high-purity limestone deposits are known to occur in southeast Arizona. At least seven have been mined in the past, and four are still being mined. Therefore, closing the Empire Mountains would not prevent the mining of this important resource, and the cumulative impacts to the limestone industry would be slight. The cumulative impact to the copper mining industry under Alternative 2 would also be slight because the industry has not shown an interest in exploring for copper in the Cienega Basin and Empire Mountains for the last 30 years. Moreover, no interest is expected for the foreseeable future.

### *Impacts to Locatable Mineral Development from Alternative 3*

Alternative 3 would open all public lands to mineral location except lands within areas of critical environmental concern, including the Appleton-Whittell Research Ranch. Alternative 3 would open up 40,509 more acres (74% more land) to exploration for locatable minerals than would Alternative 1. Combined with the split-

estate lands, lands open to location would amount to ~~46,882~~ 48,124 acres (~~85~~ 86% of the federal mineral estate in the planning area). About 95% of the planning area would then be open to mining on either federal mining claims or state leases. This would be an increase in area open to mining of about 30% from current management (Alternative 1).

### *Cumulative Impacts–Alternative 3 on Locatable Mineral Development*

More land would be open to mineral location in southeast Arizona. Exploration and mining are not expected to increase much in the foreseeable future.

### *Impacts to Locatable Mineral Development from Alternative 4*

Alternative 4 would have the same effect on locatable mineral development as would Alternative 2.

### *Summary* ~~*Overview*~~

Alternative 1 would help meet the goals and objectives for the planning area by limiting mining to a few scattered tracts throughout the planning area. Alternatives 2 and 4 would meet the goals and objectives more immediately by not allowing any mining on public lands within the planning area. Alternative 3 would not meet the goals and objectives in the short term because mining would create direct adverse impacts to water quantity, upland vegetation, upland wildlife, scenic beauty, and watershed health, and indirect adverse impacts to water quality and aquatic life. Only in the long term, after the disturbances have been reclaimed, could the goals and objectives be maintained.

### *Impacts to Salable Minerals*

### *Impacts to Salable Mineral Development from Alternative 1 (Current Management)*

BLM does not grant sales of mineral materials on public lands within the planning area. The urban growth centers of Tucson and Sierra Vista obtain their sand and gravel from sources closer to home. Therefore, closing the planning area to salable mineral development is not affecting the supply of sand and gravel for Tucson and Sierra Vista. Moreover, no one has shown an interest in mining sand and gravel in the planning area. Mineral material sales on private surface split-estate lands can be sold only to the surface owner.

### *Impacts to Salable Mineral Development from Alternative 2*

The impacts to salable mineral development under Alternative 2 would be the same as under Alternative 1.

### *Impacts to Salable Mineral Development from Alternative 3*

Under Alternative 3, BLM would not authorize mineral material sales within areas of critical environmental concern, including the Appleton-Whittell Research Ranch but would authorize them on other public lands in the planning area. This authorization would open up 40,509 more acres to mineral material sale applications for a total of ~~46,882~~ 48,124 acres of public lands and public mineral estate. BLM would analyze mineral material applications on a case-by-case basis, and sales on the ~~4,474~~ 5,727 acres of private surface split-estate lands would be limited to the surface owner.

### *Cumulative Impacts--Alternative 3 on Salable Mineral Development*

Opening BLM lands to saleable minerals would provide many sources of sand and gravel to the mining industry. BLM expects little interest in sand and gravel sales in the planning area in the foreseeable future because of prohibitive haul distances to markets. For future road construction on Highways 83 or 82, the Arizona Department of Transportation might need to find material sources within the planning area.

### *Impacts to Salable Mineral Development from Alternative 4*

The impacts to salable mineral development under Alternative 4 would be the same as under Alternative 1.

### ***Summary*** ~~***Overview***~~

Alternatives 1, 2, and 4 would help meet the goals and objectives by closing the public land portion of the planning area to sales of mineral materials. Alternative 3 would not meet the goals and objectives in the short-term because mineral material sales would harm upland wildlife, upland vegetation, scenic beauty, and native plant diversity and abundance in the short- term. In the long-term, after mining has ceased and the site has been reclaimed, the objectives and goals could be met.

## Impacts to Recreational Mining

### *Impacts to Recreational Mining from Alternative 1*

Alternative 1 would not affect recreational mining.

### *Impacts to Recreational Mining from Alternatives 2, 3, and 4*

Prohibiting the public from recreational mining (e.g., gold panning, dredging, sluicing) in the areas of critical environmental concern would effectively close off Cienega Creek and many of its tributaries to recreational mining. But this prohibition would little affect recreational mining because currently and historically recreational mining has occurred on national forest lands around Greaterville, where there are known occurrences of placer gold.

## Impacts to Ranching and Livestock Grazing

**Scope of Analysis:** This section uses the acreage open to grazing, allowable use levels, and other constraints to compare the impacts of the alternatives on livestock grazing.

### *Impacts to Ranching and Livestock Grazing from Alternative 1 (Current Management)*

Alternative 1 would maintain ranching operations on public lands in the four allotments where families are employed in rural agriculture (i.e., Empire, Empirita, Vera Earl, and Rose Tree ranches) at least for the next 10-20 years.Currently, livestock do not graze BLM-administered lands in the Empire Mountains.

That BLM has no coordinated public outreach for the public lands in the planning area. **Because of this, there is little education on the** ~~and does little to reduce the~~ harm of growing recreation use on livestock operations or ~~to explain~~ **explanation of** the benefits of preserving rural lifestyles, traditional uses, and open space.

On the Empire-Cienega allotment, variable stocking rates under a flexible grazing system result in variable net cash returns to the grazing permittee. Variable stocking rates also result in variable grazing receipts for BLM.

### *Cumulative Impacts–Alternative 1 on Ranching and Livestock Grazing (Current Management)*

The Sonoita Valley area is shifting from a rural to suburban economy. Recreation and ecotourism uses of the public lands are rapidly increasing. As urban centers continue to expand, the Sonoita-Elgin area is attracting people who want to escape the sprawl of cities. Recreation on public lands is continuing to increase in the planning area with very little regulation or constraint on its growth.

The increase in visitors and their diverse activities would continue until it is no longer feasible or suitable to graze cattle. Visitors are leaving gates open, vandalizing improvements, and starting wildfires. Roads must be maintained more often. The cumulative effect of these impacts is to increase the labor and capital outlay of the ranchers. The operations become less viable. Also, as the number of people recreating on the public lands continues to increase, the direct conflicts between people and livestock would increase. Recreation development under Alternative 1 would continue to increase until livestock grazing is not feasible. The shift from a rural agricultural-based economy to a residential- and service-related ecotourism economy would continue. The private lands would continue to be sold for residential and business development, decreasing the amount of open space for ranching. As private lands are sold off, the demand for more subdivision property next to the protected public lands would increase the demands for the State Land Department to sell State Trust Lands for development. Agricultural uses could not afford to compete with residential development in purchasing the lands. The trend would be toward less land for rural uses such as livestock grazing.

### *Impacts to Ranching and Livestock Grazing from Alternative 2*

Alternative 2 would maintain ranching operations on public lands in four units where families are employed in rural agriculture for the next 10-20 years. In addition, it would create a new grazing allotment on public lands in the Empire Mountains and could generate personal income of more than $1,700 and $300 in grazing receipts on this allotment.

Implementing flexible grazing systems on all the allotments would result in variable stocking rates, cash returns, and grazing receipts.

To conduct their business livestock operators rely on water from streams and wells. **These water sources are located** on lands with various owners **The livestock operators also rely on obtaining various land use permits including access, utilities, and grazing leases.** Under Alternative 2, operators would continue to obtain these authorizations on public lands. There are currently few restrictions on drilling new wells. As they develop riparian pastures, ranchers must obtain authorizations to develop and use alternative water sources in the adjacent uplands. Resource conflicts would be resolved through the National Environmental Policy Act(NEPA) process and the biological planning process.

Alternative 2 would implement a coordinated outreach strategy. BLM would interpret the area for its values and uses and disseminate this information to the public through an outreach plan. This plan would educate the public and improve the public's understanding and knowledge of proper use. This outreach would include explaining the benefits of preserving rural lifestyles, traditional uses, and open space.

The proposed ACEC should raise public awareness of the importance of the planning area and its sensitive resources and help in obtaining increased levels of funding to acquire the inholdings. The inholdings would better protect resources that support grazing operations.

### *Cumulative Impacts--Alternative 2 on Ranching and Livestock Grazing*

As described for Alternative 1, the shift from a rural agricultural-based economy to a residential- and service-related ecotourism economy would continue under Alternative 2. Acquiring private land inholdings could reduce the amount of open space lost in the planning area. Otherwise, owners could sell these lands for residential and business development, decreasing the amount of open space for

ranching. BLM's acquisition or protection of State Trust Lands would greatly benefit the protection of all resources and uses in the planning area, including grazing operations for the long-term. Agricultural users could afford to obtain use authorizations on the acquired properties. The trend would be toward more land for rural uses such as grazing.

Recreation and ecotourism are rapidly increasing on the region's public lands. As urban centers continue to expand, the Sonoita-Elgin area would attract people who want to escape urban sprawl. Recreation uses on public lands would continue to increase up to the capacity of the zones.

### *Impacts to Ranching and Livestock Grazing from Alternative 3*

Alternative 3 would also maintain ranching operations on public lands in four allotments where families would be engaged in rural agriculture for the next 10-20 years. In addition, Alternative 3 would create a new grazing allotment on public lands in the Empire Mountains. This allotment could generate personal income of more than $1,700 and $300 in grazing receipts. Grazing operators could still obtain the permits and authorizations to conduct their operations.

Establishing fixed conservative stocking rates for the allotments could reduce incomes due to fewer available AUMs. But incomes could be slightly more stable since stocking rates would not be as variable. Also, BLM would lose a small amount of revenue in grazing receipts. Alternative 3 would create a new grazing allotment in the Empire Mountains. This allotment could generate personal income of more than $1,700 and $300 in grazing receipts.

### *Cumulative Impacts--Alternative 3 on Ranching and Livestock Grazing*

Cumulative Impacts under Alternative 3 would be similar to those under Alternative 2.

### *Impacts to Ranching and Livestock Grazing from Alternative 4*

Alternative 4 would eliminate ranching operations on public lands in the four allotments where families are employed in rural agriculture (i.e., Empire, Empirita, Vera Earl, and Rose Tree ranches). Currently, livestock do not graze on BLM-administered lands in the Empire Mountains. Alternative 4 would result in the loss of more than $129,000 in personal income on the Empire-Cienega allotment and a loss offederal grazing receipts. This loss would reduce funding for rangeland improvements.

BLM would be required to fence the public lands to keep livestock grazing on adjacent lands out. If **all the public lands including the many scattered parcels were fenced to exclude livestock,** about 110 miles of fencing would be needed ~~at a cost of $555,000.~~ **However, by utilizing existing fencing, livestock could be excluded from about 50% of the public lands including most of the riparian areas without the need to develop additional fencing. Other fencing configurations could be utilized to fence out the majority of public lands with about 40-50 miles of fencing.**

In addition to the required fencing, BLM would have to assume the maintenance responsibility for the new fencing as well as for the existing boundary fencing. BLM's experience in managing the San Pedro Riparian National Conservation Area also shows the need for hiring more staff to detect and resolve unauthorized grazing **use on the public lands excluded from grazing if surrounding lands are grazed. If the State Trust and private lands surrounding the public lands are not being grazed, then these grazing trespass costs would not be incurred. The fencing, fence maintenance, and trespass monitoring costs incurred by BLM under Alternative 4 would therefore be variable.**

### *Cumulative Impacts--Alternative 4 on Ranching and Livestock Grazing*

There are several scenarios which could occur relating to the State grazing leases held by BLM with differing impacts. BLM could sell the state grazing leases, it could obtain the resources to pursue a commercial permit, or it could apply for conservation use on State Trust lands. Under Alternative 4, BLM ~~would likely~~ could sell the State of Arizona livestock grazing leases on the Empire-Cienega and Empirita ranches to the private sector. Well permits and water rights on the public lands obtained for livestock grazing would need to be relinquished or abandoned and new applications filed. The wells not being used for wildlife or recreational purposes would need to be abandoned and sealed. Water rights on the State Trust Lands would probably have to be sold with the grazing leases.

The Bureau managed lands tend to divide the valley east and west along Cienega Creek, and north to south from the Whetstone Mountains to the Santa Rita Mountains. Thus if the public lands (approximately 50,000 acres) are removed from existing ranches, the result would be creation of four quadrants of State Trust Lands (totaling about 100,000 acres) and private lands (totaling about 50,000 acres) with the public lands in the center. This would topographically create seven areas which could be put together as smaller ranches. As the ranches are fragmented into smaller units with less land available for grazing they become less attractive to ranchers and less viable economically.

Under this scenario, Alternative 4 would hasten the trend away from a rural society. The four families would no longer derive income from livestock produced using forage from the planning area's public rangelands. Cancelling the grazing authorizations would seriously affect the Empire-Cienega and Rose Tree ranches. The public relations of eliminating livestock grazing on public lands would contribute to and probably hasten the elimination of livestock grazing on other properties.

As the agricultural nature of this area is lost, more pressure would come to bear on the State of Arizona to sell the State Trust Lands for development, which would likely soar in value due to the closeness to the federally protected resource lands. The sale of State Trust Lands would increase ~~the~~ residential construction andother commercial development, removing open space and native vegetation at a faster rate and providing progressively fewer options for continuing ranching as the resources on which this activity depends would become increasingly scarce.

If conservation use was applied for and obtained on State Trust lands surrounding the public lands, then opportunities for continuing livestock ranching would be very limited in the area

## Impacts to Outdoor Recreation

**Scope of Analysis:** This section uses changes in recreation opportunity settings (see Table 2-7), corresponding changes in recreation experiences, and changes in access to compare the impacts of the alternatives on outdoor recreation.

### *Impacts to Outdoor Recreation from Alternative 1 (Current Management)*

#### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*

The lack of planned and integrated upland, riparian, and aquatic vegetation management under Alternative 1 might over the long-term detract from natural and semi-primitive recreation settings, particularly if plant

invasions (both native and exotic) detract from some visitor's expectations of the area's scenery. Some short-term impacts to these settings and associated recreation experiences would be expected from vegetation treatments that BLM might authorize on a case-by-case basis.

*Fish and Wildlife Management*
Current wildlife management enhances most recreation activities as shown on the register sheets collected over the past 10 years. Viewing wildlife was among the highest desired recreation activities reported. Hunting opportunities are high under current management, but the number of hunting opportunity comments received was lower than the number of wildlife viewing opportunity comments received.

*Visual Resource Management (VRM)*
A Class III VRM designation under current management could affect visual resources and the overall viewshed in the long-term because Class III allows for some modification to the existing character of the landscape and could harm existing recreation opportunity settings, particularly with reductions in naturalness. Currently, a mostly natural appearing environment can be viewed from popular vantage points, such as portions of the main scenic highway and from most of the planning area roads and the ranch headquarters. Some current visual intrusions are power lines, dirt tanks, fences, roads, trails, a kiosk, and an airstrip. These intrusions slightly reduce visual quality but are generally consistent with Class III.

*Cultural Resource Management*
Under current management, the historic ranch headquarters offers opportunities for sightseeing and discovering the past and often becomes a focal point for most visitors and commercial tour guides. Currently, BLM gives visitors only a limited interpretation of the site. Gradual deterioration of historic structures and contents due to vandalism and weathering diminishes the quality of this recreational setting by creating health hazards and loss of the site's character. Alternative 1 lacks a comprehensive cultural interpretation program that could improve tourism needs while protecting the resource.

**From Land Use Allocations**

*Mineral Development*
Mineral development on public lands open to mining could change current recreation opportunities and visitor access, causing a loss of more primitive recreation experiences and scenic qualities. Motor traffic and road maintenance requirements could later increase and some road conditions would change.

Mineral development conflicts with the more primitive to semi-primitive motorized recreation in a mostly unmodified or natural appearing environment. Current recreation opportunities offer shared backcountry roads from two paved state highways (Highways 82 and 83) for motor vehicles, hikers, and horseback riders for day excursions, camping, and sightseeing. Potential new service roads for mineral development could provide motorized access points to previously inaccessible areas for sightseeing, casual recreation, exploration, and hunting

But many roads to mineral development sites restrict visitors. So motorized recreational use on new service roads could be limited, and some roads open to motorized recreation could be closed. Any roads that are shared with mineral development use might be more hazardous for motorists due to frequent encounters with larger mining vehicles.

Other recreation users, such as backpackers and hikers seeking more solitude, would benefit from restricted motorized access because it would reduce encounters with other visitors and their activities. But encounters with mining

vehicles and activities would increase on service roads and at mines. Mineral development could change current opportunities and settings from a primitive experience and semi-primitive motorized experience to rural. (See Recreation ~~Spectrum~~ Opportunity Settings, Table 2-7 in Chapter 2.)

*Rights-of-Way*

Utility rights-of-way and land use authorizations on public lands could change current recreation opportunities and visitor access, causing a loss of more primitive recreation experiences and scenic qualities. Motor traffic and road maintenance requirements could later increase and some road conditions would change.

Several existing utility rights-of-ways contain service roads used by visitors as access points. Even though Alternative 1 would designate no utility corridors, BLM might authorize new rights-of-way access in areas that provide primitive to semi-primitive motorized recreation opportunities. These access points for rights-of-ways could both benefit and reduce recreation opportunities. Improved access could increase visitors, providing more opportunities for motorized recreation but diminishing solitude and primitive experiences for others.

For example, unauthorized access points might increase for BLM lands. Some recreation users that gain legal access usually expect to see little or no traffic in the backcountry. But visitors accessing unauthorized points in the backcountry could degrade the legal-entry visitor's expectations of solitude and self-reliance in the more primitive areas.

Most service roads are popular unauthorized access points (under BLM policy) to the backcountry. Even with Tread Lightly or other OHV education campaigns to follow rules and respect posted signs, many visitors continue to use unauthorized roads. The challenge for the utility companies and BLM is as follows:

- To gain more public support for these rules.
- To close unauthorized access points while allowing for utility service.
- To hire people to monitor and enforce random unauthorized access into remote areas.

*Off-Highway Vehicle Management*

Current off-highway vehicle management has disturbed natural and more primitive recreation settings and opportunities.

Current management restricts motor vehicles to designated roads. But BLM has only partially implemented this designation, and motorized vehicles generally travel on the existing roads and trails. Over the past 10 years visitors have illegally created many roads, and repeated use has made them permanent. Since no universally accepted definition exists for an existing road or trail, enforcement to prevent illegal use of roads is difficult.

Visitors often created these roads, wanting a more primitive setting and seeking more solitude. But illegal off-road travel often crushes vegetation, harms wildlife species and habitats, and results in loss of ground cover from campsites, fire rings, and trash accumulation.

Currently, most roads are open to all users, and conflicts arise when expectations for use of roads are not met. Potentially conflicting recreation opportunities are promoted on shared use roads, such as when horseback riding is promoted on the same road that leads to an off-highway vehicle destination area. Whether or not conflicts arise, brochures and other marketing information often promote a wide variety of recreation uses that can either deter or encourage visitation by different users.

The current road numbering system generally benefits visitors by allowing quicker emergency

help and reducing chances of getting lost. Road numbering also helps law enforcement (i.e., BLM, Sheriff, Game and Fish) regulate off-highway vehicle traffic. Several unnumbered or unsigned roads exist and complicate law enforcement and send mixed messages to users on what roads are legal. Some disadvantages of road numbering can include inadvertently directing visitors to sensitive wildlife habitat and cultural areas not signed in the past. Road numbering can give some visitors a false sense of security. Road numbering and maps can also lessen more primitive recreation experiences by directing new traffic to formerly low-use areas.

*Recreation Management*

Under current management, the lack of designated recreation zones allows for continual random campsite creation and dispersed recreational use throughout the entire planning area. Gradually changing recreation settings (due to increased visitor use) in the short and long term and the lack of consistent identified recreation expectations and opportunities (often called niches or classifications) to promote or offer to the public makes management increasingly difficult.

Therefore, the recreation resources promoted as a whole would remain indefinite and would continue to contribute to the increase of conflicts among recreationists and other public land users. This conflict could gradually lead to greater damage to vegetation, wildlife, grazing opportunities, cultural resources, and recreation opportunities.

The lack of recreation zones under current management is favorable for some recreation users who perceive that their desired activities can continue indefinitely. But over the long term all recreationists' opportunities and experiences might change with increased, relatively unplanned recreation use.

*Arizona Trail*

Under current management, not designating a corridor for the Arizona Trail means that the planning area would have one less highly desired nonmotorized trail. No Arizona Trail designation also means that a cumulatively large (500+ visitors a year) target audience is not attracted to the area. And visitors might create random social trails for the lack of a singlemarketed designated trail. (A social trail is an unplanned random trail made by initial visitors and then followed by others).

*Livestock Grazing ~~Management~~*

Generally, livestock grazing coexists with most recreation use in the area with relatively few impacts. But livestock grazing issues and impacts to recreation depend on individual expectations and knowledge of the area's grazing practices. Safety and health issues can be a concern. In extreme cases, cattle can harm people by charging. Other health concerns include contaminated water sources and insect pests from cattle waste. Camping in areas with cattle can detract from a high-quality recreation experience. But some visitors are not concerned about cattle at their campsites. The presence of cattle can enhance some visitor experiences because it is one of the niches promoted by tourism offices as an "Old West Theme " area and adds to the historic ranch atmosphere. Visitors often use trails created by cattle for hiking, bicycling, and horseback riding and also use water sources created for cattle.

Inconsistent promotion of recreation in the area without always explaining the grazing program can create differing expectations and reactions by visitors upon arrival. The lack of an effective interpretation program under current management adds to mixed qualities of recreational experiences when visitors encounter cattle operations.

**From Special Designations**

*Areas of Critical Environmental Concern*
Lack of any other ACEC designations under current management might slightly lower the quality of the recreation opportunity settings because sensitive resources might be at greater risk of being degraded.

## *Cumulative Impacts--Alternative 1 on Outdoor Recreation*

Under Alternative 1, visitors to the planning area would continue to find rural to primitive recreation opportunities over the short term. However over the long term these recreation opportunities may not be maintained due to lack of recreation zones and associated management actions. This might impact the range of recreation opportunities available in southeastern Pima and northeastern Santa Cruz counties. Additional exclusively non-motorized trails would not be available. Visitors would continue to experience inconsistent management and differing regulations on intermixed public and State Trust lands. Without the Las Cienegas Implementation Strategy, it might take much longer for additional acquisitions of public lands. Without additional acquisitions, the conflicts associated with differing mandates for managing public and State Trust lands would continue.

## *Impacts to Outdoor Recreation from Alternative 2*

**From Desired Resource Conditions**

*Watershed: Upland, Riparian, and Aquatic Vegetation Management and Fish and Wildlife Management*
The proposed actions for watershed, upland, riparian, and fish and wildlife management enhance the overall recreation settings and opportunities, but specific proposals may degrade some recreation opportunities and settings.

Some traditional campsites along Cienega Creek would be lost, but these campsites did not conform to the Leave No Trace ethics of camping too close to water. Restricting camping to areas 100 feet or more from water would increase wildlife viewing opportunities and improve vegetation and water quality conditions, desirable for most visitors. Limiting nonmotorized and motorized crossings of Cienega Creek for permitted group activities would concentrate impacts at designated crossings. Large groups would lose some sightseeing opportunities in the riparian zone. Vegetation treatments, such as prescribed fire, might degrade recreation settings in the short-term. In the short-term, visitors would benefit from the presence of fuel wood, and the removal of unwanted fuel wood tree stumps would improve visual resources. Recreation opportunities and settings, such as wildlife viewing and hiking in more natural appearing settings, would improve in riparian areas.

*Visual Resource Management (VRM)*
VRM Class II is the same classification required in many wilderness areas, where fewer alterations to the landscape can be allowed. Designating this classification on the public lands within the planning area would moderately affect past and future recreation developments. The Class II designation would help maintain desired recreation opportunities and settings, including a more natural appearing and primitive recreation setting.

*Cultural Resource Management*
Enhancing cultural resources through an interpretive and educational program and structure stabilization, especially at the Empire Ranch headquarters, would satisfy and direct most visitors to that area and would reduce impacts to backcountry areas that are intended to be more primitive to semi-primitive.

**From Land Use Allocations**

*Mineral Development*
Alternative 2 would eliminate potential impacts from mineral development under Alternative 1, if no valid existing claims are developed. Prohibiting recreational mining in riparian areas would eliminate one potential form of recreational activity. But the prohibition would help maintain the resources and conditions that provide existing primitive and semi-primitive opportunities and settings for other visitors. Most recreational mining occurs in the Santa Rita Mountains in Coronado National Forest and would not be affected by this proposal.

The administrative use of mineral material would reduce the cost of most recreation projects, including road maintenance designed to protect resources while allowing recreational use.

*Utility Rights-of-Way and Land Use Authorizations*
Designating utility corridors should minimize the degrading of visual resources at recreation settings by utility developments and minimize conflicts of recreation use of utility access routes. Establishing a utility corridor next to the existing El Paso Gas line could perpetuate the need for the existing access road and further increase impacts from recreation use of this road. Continued recreation use of the service road would remain a constant challenge to maintain the more primitive recreation settings and opportunities.

*Off-Highway Vehicle Management*
Fully implementing the *limited to designated* roads designation would create a wider variety of recreation opportunities and reduce user conflicts. Some roads proposed for closure would allow nonmotorized use, such as horseback riding and hiking, without sharing the routes with motor vehicles. Nonmotorized routes are in demand and this designation would reduce the need to build new nonmotorized routes and lessen recreation conflicts. Overall, this designation would prevent negative impacts to desired recreation opportunities and natural resources.

Assigning numbers to roads that have been previously unsigned could give a false perception of safety and might direct unprepared visitors to rough backcountry roads. To avoid this pitfall, BLM would also need to sign road conditions. Intrusive road signs could slightly degrade Class II visual resource management classifications and have a slight effect on recreation settings.

*Recreation Management*
**Some positive impacts from the Alternative 2 route designations are that several road segments will be offered as non-motorized trails. This action fulfills a highly desired setting and opportunity that would benefit many visitors.**

Establishing an individual recreation permit system would help preserve existing recreation settings and opportunities while recreation demands increase by addressing the area's recreation capacities. The option of a fee program could have several impacts:

- Recreation infrastructure proposals might not meet Land and Water Conservation Fund criteria for setting up fees for use of the entire area.

- Fee collections require more on-the-ground staff for compliance with Titles 36 and 43 of the Code of Federal Regulations.

- Overseeing a fee collection system could cost more than the actual fees recovered.

Establishing fees for a permit system could either dissuade or attract visitors. Those not wanting to pay the fees might choose to recreate

elsewhere. Others might view the fees as an indication of the presence of a desirable recreation infrastructure. The planned recreation infrastructure might not meet the expectations of some of these visitors. The collected fees can be reinvested at the site of collection to mitigate recreation-related resource impacts and build and maintain recreational developments. Collected fees could be used to pay for a recreational land use permit from the Arizona State Land Department for public recreation on State Trust Lands. Such a permit would help reduce current confusion and issues of intermixed lands with differing mandates and management.

The specific recreation factors outlined in Table 2-26 establish a particular BLM recreation management niche. This niche can be described as an NCA that will emphasize three recreation zones that provide opportunities that range from rural to primitive and activities that will maintain the Cienega Valley basically as it appears now. Very little development is planned. Visitors seeking traditional developed campsites that contain permanently installed tables, shade structures, and other developments will be guided to visit other agency's or private recreation areas that are managing settings and opportunities to meet those expectations.

BLM and other promoters should be aware of this specific niche and provide consistent and accurate information that informs visitors of the more primitive nature so that expectations are met upon arrival. For instance, the speed limit will average 15- 25 mph throughout the entire NCA. This speed limit is a positive outcome for OHV users that enjoy slower travel speeds and encounters with others traveling at slower speeds. People hiking or horse back riding sharing routes with motorized vehicles will also benefit from this result. Visitor's with expectations to drive motorized vehicles at higher speeds will be guided to other suitable OHV areas outside of the NCA.

The proposed recreation zone classifications under Alternative 2 could create a wider variety of recreation opportunities and settings. Zones 1 and 2 would protect natural resources more than they are protected now and would enhance recreation settings. Zone 3 might undergo an increase of use if campsite demands exceed designated sites in Zone 2. Law enforcement needs are expected to increase because there would be more restrictions to enforce.

All three recreation zones would allow some development to protect resource conditions. Such development could include providing a hardened surface. At Maternity Well, the option of installing a graveled parking lot would slightly alter the current recreation setting. Gravel might be an undesirable surface for most group overnight and day use, but it could keep dust from blowing. Gravel, pavement, or other surface hardening should be viewed as a last resort to mitigate recreation impacts. If erosion is occurring, BLM should first consider other light-handed methods in order to maintain more natural settings.

Under Alternative 2, recreation zone prescriptions, individual visitors would not be able to use the new Maternity Well site, which would be limited to groups under permit. Individual users who have been displaced from a traditional use area would most likely move to Zone 3 close to the main highways and roads or on other non-BLM areas. Displaced users of the northeast corner of old Agricultural Fields would not be harmed as much as individual Maternity Well users because the Agricultural Fields site has not been used as much as the Maternity Well site. Other designated group areas open to individual or casual use when not reserved by a group would slightly increase in use.

It is legally difficult to remove an individual camper if a group event is scheduled at the same time the individual is present. BLM must post a

notice on the site at least two weeks in advance to advise individual campers of upcoming reserved site status. Closing off a reserved area would require more management intervention with a reservation system, opening and closing of the site, and on-site people to monitor the campsites. Zone 2 areas would more restrict campsite selection than Zone 3 areas, because Zone 2 prescriptions require use of designated camping areas. But this requirement can assure a consistent dispersed camping experience during times of high visitor use. In designated camp areas, newly arrived campers are less likely to infringe on the camping space picked out by an already present visitor. Such infringement is more likely in Zone 3. If the number of designated campsites remains low, a primitive to semi-primitive motorized experience can be maintained. Sites would fill quickly during high use and would require more monitoring for compliance.

*Arizona Trail*

Designating a corridor for the Arizona Trail would give the planning area a highly desired nonmotorized trail and help reduce user conflicts on shared motorized-nonmotorized routes. The Arizona Trail might attract a cumulatively large (500+ a year) group of visitors to the area. This single marketed designated trail might reduce the creation of random social trails. An indirect impact might be the non-recreation use of the trail, such as by undocumented immigrants or persons involved in illegal border activities. This use in turn might increase trash, erosion, and human waste at large camps and degrade recreational settings and experiences.

*Livestock Grazing*

Impacts to outdoor recreation from Alternative 2 grazing proposals would be similar to those under Alternative 1. Creating a new grazing allotment would expand potential conflicts between grazing and visitors to the Empire Mountains. Alternative 2 would bring recreational users into the biological planning process, which should help reduce conflicts.

**From Special Designations**

*Areas of Critical Environmental Concern*

The ACEC designation would benefit primitive and semi-primitive recreation opportunities and settings by maintaining and protecting the sensitive resources in these areas.

***Cumulative Impacts--Alternative 2 on Outdoor Recreation***

Under Alternative 2, the public lands in the planning area would provide rural to primitive recreation opportunities for visitors to Pima and northeastern Santa Cruz counties. There would be opportunities for both motorized and non-motorized activities and additional exclusively non-motorized trails would be available. Visitors seeking developed recreation sites and other associated recreation infrastructure would not find these recreational opportunities on public lands in the planning area

Implementation of the Las Cienegas Acquisition Strategy would result in acquisition of additional public lands in the planning area which would provide large areas of open space and associated rural to primitive recreation opportunities. The public lands would be protected from future development and managed to maintain these recreation opportunities. Visitors would not be confused by conflicting mandates and differing regulations associated with management of intermixed public lands and State Trust lands. Instead they would receive consistent informational, interpretive, and regulatory messages. Implementation of the strategy would be expected to result in increased public access in the planning area.

## *Impacts to Outdoor Recreation from Alternative 3*

### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Resource Management*
Impacts under Alternative 3 would be the same as under Alternative 2.

### From Land Use Allocations

*Mineral Development*
Mineral development under Alternative 3 would have the same type of impacts on recreation as under Alternative 1. But under Alternative 3 these impacts could occur on a much larger scale and could be much greater.

*Utility Rights-of-Way and Land Use Authorizations*
Impacts under Alternative 3 would be similar to those under Alternative 2, but under Alternative 3 they might occur over a larger area because of the third utility corridor.

*Off-Highway Vehicle Management*
Impacts under Alternative 3 would be the same as under Alternative 2.

*Recreation Management*
Impacts under Alternative 3 would be similar to those described for Alternative 2. The Zone 2 and 3 configuration under Alternative 3 would maintain a more natural or primitive corridor on the main touring road heading north towards the Agricultural Fields. Camping would not be allowed along the corridor unless in a designated spot. Negative impacts along the road would be reduced. And an overall high visual quality and sense of being in a more primitive area would be maintained

*Arizona Trail*
Impacts under Alternative 3 would be the same as under Alternative 2. *Livestock Grazing*
Impacts would generally be similar to those described for Alternatives 1 and 2. But under Alternative 3, adverse impacts to recreation settings could increase in drought years if stocking rates are not reduced. Impacts to the recreational settings could include bare soil in camping areas.

### From Special Designations

*Areas of Critical Environmental Concern*
Impacts under Alternative 3 would be the same as under Alternative 2.

## *Cumulative Impacts--Alternative 3 on Outdoor Recreation*

Cumulative impacts under Alternative 3 would be the same as those under Alternative 2.

## *Impacts to Outdoor Recreation from Alternative 4*

### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

### From Land Use Allocations

*Mineral Development*
Impacts under Alternative 4 would be the same as under Alternative 2.

*Utility Rights-of-Way and Land Use Authorizations*
Impacts under Alternative 4 would be similar to those under Alternative 2. Not having a designated utility corridor next to the existing El Paso gas line would reduce the need for more service roads. The indirect impact might be the potential for the gas line road to be eliminated over time because new gas line technology might not require a service road. Therefore, a more primitive recreation setting could evolve. But visitors use the service road as access to the

northern portion of the planning area. If the service road is ever closed, this access would be lost. The existing right-of-way in the planning area's northeast corner could be used for other types of rights-of-way. Impacts from this utility line already exist, and much of this line is not within the prime viewshed. But this line might not conform to Recreation Zone 3 prescriptions because it requires a service road that is used by the public. The road and its use, therefore, reduce the more primitive qualities of desired recreation settings.

*Off-Highway Vehicle Management*

Impacts of off-highway vehicle designation under Alternative 4 would be the same as under Alternative 2. The proposed road closures under Alternative 4 would affect some nonmotorized activities. No exclusively nonmotorized routes would be created, and all routes would be shared motorized-nonmotorized use, which is likely to increase user conflicts. Bicyclists and other mechanized vehicle users would have to remain on roads, whereas hikers and horseback riders would not. But no one would be allowed to use former roads designated for closure because they would be undergoing rehabilitation. Therefore, potential nonmotorized routes would be eliminated. Visitors might create new social trails in areas along old roadways.

*Recreation Management*

Impacts under Alternative ~~3~~ 4 would generally be similar to those under the other alternatives. Under Alternative 4, desired recreation settings might be harder to maintain if visitor use increases dramatically. Most of the area would be prescribed for dispersed recreation use, and the least amount of area would be in the more restrictive Zones 1 and 2 (designated camp areas, group areas, and pullouts).Arizona Trail Because the Arizona Trail would be shared use under Alternative 4, motorized-nonmotorized user conflicts would increase if the trail is designated on existing roads. The Arizona Trail planners might be forced to seek other routes outside public lands in the planning area because the shared use prescription would not meet the trail's goals. Placing the Arizona Trail trailhead at the Empire Ranch headquarters might conflict with Master Plan prescriptions. Overnight parking for the trail might also conflict with the desired settings and goals of the Master Plan.

*Livestock Grazing*

Recreation use might increase if livestock grazing is removed from the public lands. Conflicts directly related to cattle grazing would decline, but conflicts with livestock could remain because equestrian recreation might increase. Corrals, water sources, and trails created by cattle might remain and be used by visitors. But maintenance costs of these developments would be transferred to BLM. Requests to hold large or numerous livestock-dependent events would increase. Recreational horseback riding impacts could replace grazing operation impacts on a smaller scale with higher impacts concentrated in popular areas. Increased opportunities for livestock-related and general special recreation permits would result.

**From Special Designations**

*Areas of Critical Environmental Concern*

Impacts under Alternative 4 would be the same as under Alternative 2.

### *Cumulative Impacts--Alternative 4 on Outdoor Recreation*

**Cumulative impacts under Alternative 4 would be similar to those under Alternative 2. However under Alternative 4, the public lands in the planning area would not provide any additional exclusively non-motorized trails in southeastern Pima County or northeastern Santa Cruz counties for recreationists seeking this opportunity.**

# SPECIAL DESIGNATION AREAS

## Impacts to Wild and Scenic Rivers

**Scope of Analysis:** This section uses impacts to the resources and character of the wild and scenic river study area to compare the impacts of the alternatives on wild and scenic rivers.

### *Impacts to Wild and Scenic Rivers from Alternative 1 (Current Management)*

Impacts of current management on the wild and scenic river study area and values were analyzed in the Arizona Statewide Wild and Scenic River Legislative Environmental Impact Statement (LEIS) (BLM 1994c).

#### From Desired Resource Conditions

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*
Existing watershed management would continue to protect the wild and scenic river study area and values. Actions that benefit the area have included stream restoration projects, prohibition of fuel wood cutting, and closure of hazardous roads or roads that disturb sensitive riparian areas.

*Fish and Wildlife Management*
Existing fish and wildlife management would continue to enhance Cienega Creek's wild and scenic river values as long as any creek restoration: (1) uses rocks and materials that are neither visually disturbing nor chemically toxic, and (2) assures rehabilitation or naturalizes impacts such as cut tree limbs, stumps, and heavy equipment tracks. Current signing methods should comply with Arizona statewide wild and scenic river guidelines. Visual Resource Management (VRM)
A Class III VRM designation could allow for some intrusions on the current scenic values of Cienega Creek.

*Cultural Resource Management*
Existing cultural resource management is consistent with protecting wild and scenic river values. Any impacts from data recovery projects in the wild and scenic river corridor could increase bank erosion, which would need to be mitigated. Data recovery projects (i.e., archeological digs) are rare and normally fit in visually and comply with outstandingly remarkable scenic values.

#### From Land Use Allocations

*Mineral Development*
Disturbance from any large-scale mining in the Empire Mountains could impair wild and scenic river values and would be mitigated through the required mining plans of operations. Mitigation for smaller mines should prevent degraded tributaries that could slightly affect Cienega Creek's wild and scenic river suitability.

*Utility Rights-of-Way and Land Use Authorizations*
Under current management, BLM would discourage new transmission lines and natural gas lines within the wild and scenic river corridor. Rights-of-way in this corridor could degrade outstandingly remarkable values. Unauthorized motorized access on closed service roads could allow cumulative harm, including tree and vegetation degradation from unauthorized firewood collecting.

*Off-Highway Vehicle Management*
Continuing use of all existing roads might degrade portions of Cienega Creek where vehicle traffic is now being allowed in the wild and scenic river corridor. This area includes the Narrows and other portions of Cienega Creek used for motorized crossing. Impacts could include erosion, damage to stream banks, and discharged oil or other fluids from motor vehicles crossing or getting stuck in the creek.

The presence of many existing roads could slightly degrade wild and scenic river values. Too many easily accessible motorized points could encourage cumulative trampling and cutting of vegetation for firewood and cleared ground for dispersed campsites. Roads that dead-end within the wild and scenic river corridor contribute to destination camping spots being located too close to sensitive riparian resources.

*Recreation Management*
Lack of recreation management zones would not affect the character of the wild and scenic river corridor or its outstandingly remarkable values.

*Arizona Trail*
Lack of designation of a route for the Arizona Trail would prevent attracting a cumulatively large target audience for the trail. But random social trails might develop for lack of a single marketed and designated trail.

*Livestock Grazing*
Restricting cattle from most of the wild and scenic river corridor under current management helps protect wild and scenic river values. To protect remarkable and outstanding features, BLM should continue to implement alternative nonintrusive livestock watering techniques out of the creek bed. In addition, BLM should design actions to maintain state water quality standards.

Use of livestock crossing lanes and watering areas impairs some wild and scenic river values. The public's negative perceptions of grazing in a wild and scenic river corridor could be moderate to high. Because Cienega Creek's flow is generally low, livestock manure in the creek from use of lanes and watering areas lowers water quality and might prevent the creek from meeting state water quality standards. Livestock trampling and foraging while using lanes and watering areas would also locally damage riparian areas.

**From Special Designations**

*Areas of Critical Environmental Concern*
Lack of an ACEC designation should not affect a stream's suitability as a wild and scenic because Alternative 1 (Current Management) already mandates management to protect wild and scenic river suitability. Where wild and scenic river mandates might overlap with ongoing actions, the more stringent actions would apply.

## *Impacts to Wild and Scenic Rivers from Alternative 2*

**From Desired Resource Conditions**

*Watershed: Upland, Riparian, and Aquatic Vegetation Management*
The overall prescriptions for watershed, upland, and riparian areas would help Cienega Creek retain its suitability for wild and scenic river status. Some prescriptions such as burning or cutting trees could temporarily detract from scenic quality within the short-term, depending on visitor perceptions, knowledge, and expectations. General wood cutting would not be allowed in the wild and scenic river study area. Administrative vegetation treatment that involves wood cutting and conforms to stricter VRM classifications by removing, camouflaging, or naturalizing cut stumps (stumps detract from scenic quality) would help maintain values.

*Fish and Wildlife Management*
Proposals would maintain wild and scenic river values as long as signing is integrated with the overall interpretive sign program and proposed developments conform to wild and scenic river prescriptions.

*Visual Resource Management (VRM)*
The more stringent VRM Class II designation under Alternatives 2, 3, and 4 would better

maintain the values of the wild and scenic river study area than would Alternative 1.

*Cultural Resource Management*
Any significant archeological excavations within the corridor could harm the resources and character of the wild and scenic river study area if gullying or erosion is not mitigated. Overall, the cultural program is expected to enhance wild and scenic river values.

**From Land Use Allocations**

*Mineral Development*
The continued closure of most of the public lands and proposed mineral withdrawal would help maintain wild and scenic river values. The potential impacts projected for Alternative 1 would not occur under Alternative 2.

*Utility Rights-of-Way and Land Use Authorizations*
Designating utility corridors away from the wild and scenic river corridor would help maintain wild and scenic river values and be consistent with the recommended alternative from the Arizona Statewide Wild and Scenic Rivers LEIS (BLM 1994c). The proposed utility corridor in the northeast corner of the planning area would cross the Cienega Creek wild and scenic river corridor, and other lines within this corridor could degrade the scenic values of the wild and scenic river study area.

*Off-Highway Vehicle Management*
Restricting motor vehicles to designated roads would reduce the potential for perpetuating illegally created roads and would help maintain wild and scenic river values. The proposed road closures would help reduce unneeded roads in the wild and scenic river corridor and would eliminate almost all wet stream crossings.

*Recreation Management*
The recreation Zone 3 designation recommended for the wild and scenic river corridor under Alternative 2 would allow dispersed camping, but Alternatives 2, 3, and 4 would not allow camping within the riparian zone. Despite this restriction, wild and scenic river portions within Zone 3 might undergo cumulative harm from dispersed recreation use.

The lack of alternative potable water sources could have cumulative impacts to the creek where hikers and horseback riders trample vegetation to retrieve water. If there are no other potable water sources, Arizona Trail users would seek water from Cienega Creek, treating the water by boiling, filtering, or using chemicals.

*Arizona Trail*
The Arizona Trail route under Alternative 2 would be compatible with wild and scenic river values. But this nationally advertised trail could bring more people to the area than might otherwise come to the area under BLM's marketing strategy. Even though the Arizona Trail and BLM advocate Leave No Trace land use ethics, a low percentage of people actually follow strict Leave No Trace guidelines. Some portions of the wild and scenic river corridor would be degraded at the following places:

- Where hikers cross the creek.
- At day use rest spots.
- In camping areas.
- Where camp fires are built.

The cumulative impacts are human waste accumulation, lowered water quality, and extensive tree damage, which can occur over time where the trail crosses into the segments of the scenic corridor or in other areas suitable for camping. Trees and other woody plants could be gradually damaged. Impacts occur more often near streams because camping near a creek in Arizona has more attraction to many visitors

than camping in sacaton grass flats or on rocky hillsides. Restrictions on camping in the riparian zone should minimize but would not eliminate these impacts.

*Livestock Grazing*
Impacts under Alternative 2 would generally be the same as under Alternative 1. In the ~~activity plan proposal~~ **livestock grazing management actions**, any water developments where livestock waste could directly come into contact with wild and scenic river creek water should be avoided to maintain high standards for water quality. BLM should consider alternative livestock watering methods. Watering methods should not be obvious or detract from wild and scenic river values.

**From Special Designations**

*Areas of Critical Environmental Concern*
The ACEC designation would add a layer of importance, perhaps pulling in more management dollars to the area and helping retain wild and scenic river values.

## *Impacts to Wild and Scenic Rivers from Alternative 3*

**From Desired Resource Conditions**

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 3 would be the same as under Alternative 2.

**From Land Use Allocations**

*Mineral Development*
Impacts would be of the same type as under Alternative 1, but would have greater potential and scope under Alternative 3 because areas outside ACECs would be open to mineral development.

*Utility Rights-of-Way and Land Use Authorizations*
Impacts under Alternative 3 would be similar to those under Alternative 2.

*Off-Highway Vehicle Management*
Impacts under Alternative 3 would be the same as under Alternative 2.

*Recreation Management*
Impacts under Alternative 3 would be similar to those under Alternative 2, but under Alternative 3 some of the wild and scenic river corridor would fall in recreation Zone 2, which might better protect wild and scenic river values because it would restrict camping to designated areas. But because Alternatives 2, 3, and 4 would restrict camping within 100 feet of the stream, the increased protection in this small area would be minor.

*Arizona Trail*
Under Alternative 3, the Arizona Trail corridor would pass through the wild and scenic river corridor and might conflict with maintaining the wild and scenic river values in the Narrows portion of Cienega Creek.

*Livestock Grazing*
Impacts under Alternative 3 would be the same as under Alternative 1.

**From Special Designations**

*Areas of Critical Environmental Concern*
Impacts under Alternative 3 would be the same as under Alternative 2 because under both alternatives the wild and scenic river study area would be included within ACECs.

## *Impacts to Wild and Scenic Rivers from Alternative 4*

### From Desired Resource Conditions

*Watershed, Fish and Wildlife, Visual and Cultural Resource Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

### From Land Use Allocations

*Mineral Development*
Impacts under Alternative 4 would be the same as under Alternative 2.

*Utility Rights-of-Way and Land Use Authorizations*
Impacts under Alternative 4 would be the same as under Alternatives 2 and 3.

*Off-Highway Vehicle Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

*Recreation Management*
Impacts under Alternative 4 would be the same as under Alternative 2.

*Arizona Trail*
The Arizona Trail would not pass through the wild and scenic river corridor under Alternative 4 and would not affect wild and scenic river values.

*Livestock Grazing*
Eliminating livestock grazing at the edge of or in the creek would benefit wild and scenic river values. But recreational livestock use might increase and have similar type of impacts.

### From Special Designations

*Areas of Critical Environmental Concern*
Impacts under Alternative 4 would be the same as under Alternative 2.

## Impacts to Areas of Critical Environmental Concern

**Scope of Analysis:** This section uses effects on ACEC resources to compare the impacts of the alternatives on ACECs.

## *Impacts to ACECs from All Alternatives*

*Impacts to Appleton-Whittell ACEC*
See the discussion of impacts to watershed, upland and riparian vegetation, and fish and wildlife from all alternatives for the impacts to the resources of the ACEC.

Current management is protecting the resources and research use of this ACEC by implementing the proposed management for this ACEC prescribed in the Phoenix RMP (BLM 1987a, 1988) through the existing cooperative management agreement.

Alternatives 2, 3, and 4 would change the name of the ACEC to the Appleton-Whittell Research ACEC to better describe it and communicate its primary use. In addition, all roads on public lands would be restricted to administrative use **and the ACEC would be closed to horseback use.** ~~This~~ **These** restriction**s** would ensure that unauthorized motor vehicle use and horseback use do~~es~~ not interfere with ongoing research projects.

Under Alternatives 2, 3, and 4, any public ands acquired south of the Babocomari Land Grant in the Sonoita Valley Acquisition Planning District would be added to the Appleton-Whittell Research ACEC which would further enhance research values of the area.

## SOCIAL AND ECONOMIC CONCERNS

### Impacts to Population and Demographics

***Impacts to Population and Demographics from Alternative 1 (Current Management)***
Alternative 1 (Current Management) would not change the population, demographics, and projections for Pima, Santa Cruz, and Cochise counties.

***Impacts to Population and Demographics from Alternatives 2, 3, and 4***
Establishing recreation zones and associated recreation management, including the designated recreation sites, would increase the number of visitors to the planning area but would not change the population and demographics of Pima, Santa Cruz, and Cochise counties.

***Cumulative Impacts--Population and Demographics***
Land tenure shifts influence population and demographics. As more land becomes available for private use and more people move into a rural setting seeking more open space, development would increase. If the surrounding State Trust or private lands are sold, the number of private dwellings surrounding the planning area might increase, but the population, demographics, and projections for Pima, Santa Cruz, and Cochise counties would not change.

### Impacts to Local and Regional Economies

***Impacts to Local and Regional Economies from Alternative 1 (Current Management)***
Alternative 1 would not change the local and regional economy.

***Impacts to Local and Regional Economies from Alternative 2***
Increased recreation resulting from proposed recreation management under Alternative 2 might benefit the local and regional economy.

***Impacts to Local and Regional Economies from Alternative 3***
Impacts under Alternative 3 would be the same as under Alternative 2.

***Impacts to Local and Regional Economies from Alternative 4***
Increased recreation resulting from proposed recreation management might benefit the local and regional economy. But eliminating public land grazing under Alternative 4 would result in a loss of $129,000 in personal income to the local and regional economy. County revenue might slightly increase if intermixed or surrounding State Trust Lands become private.

***Cumulative Impacts--Local and Regional Economies***
The local and regional economies are slowly shifting from a rural and agriculture economy to a more commercial economy tied to recreation and tourism. The local and regional economies are also benefitting from increased recreational opportunities in the region and increased commerce in the Enterprise Zone.

### Impacts to Employment

***Impacts to Employment from Alternatives 1 (Current Management), 2, and 3***
Alternatives 1, 2, and 3 would not change employment.

***Impacts to Employment from Alternative 4***
Eliminating livestock grazing on public lands would likely make ranching operations on two grazing allotments unfeasible and result in the loss of jobs on the two allotments.

### *Impacts to Environmental Justice*

None of the alternatives would have disproportionate adverse human health or environmental effects on minority and low-income populations.

## CUMULATIVE IMPACTS

Cumulative impacts include impacts from the incremental changes from all planned actions when added to other past, present, and reasonably foreseeable changes. Cumulative impacts can also result from individually minor but collectively significant actions taking place over time. When they would occur, cumulative impacts are described at the end of each impact section for each resource or program.

## IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

An irretrievable commitment of a resource is one in which the resource or its use is lost for a period of time. An irreversible commitment of a resource is one that cannot be reversed; e.g., the extinction of a species.

The extraction of any locatable mineral ore would be an irretrievable commitment of resources.

Any disturbance to cultural or paleontological resources would be irreversible, and any loss of these resources would be irretrievable.

## UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are impacts that remain following the implementation of mitigation measures, or impacts for which there are no mitigation measures. Some unavoidable adverse impacts will occur as a result of proposed management under one or more of the alternatives. Others are a result of public use of BLM-managed lands within the planning area.

Development of mineral resources could create visual intrusions, soil erosion, and compaction problems, and loss of vegetation cover.

Unauthorized off-road vehicle travel could cause scarring, increased soil erosion, and loss of vegetation cover.

Development of designated recreation sites and trails and development of livestock waters could cause soil compaction, increased soil erosion, and loss of vegetation cover.

Accidental or unauthorized introduction of exotic plant or animal species could result in harm or loss of populations of native plants or animals.

Proposed restrictions on recreation, livestock operations, and other land use authorizations to protect sensitive resources and other values would lessen the ability of operators, permittees, individuals, and groups to use the public lands and could increase operating costs.

**As a result of increased use of Federal Lands within the planning area for international smuggling of undocumented immigrants and controlled substances, much damage is occurring to the natural resources of the Las Cienegas NCA and Planning District particularly along the primary smuggling routes. As an example, damage to the riparian area and**

**endangered species habitat at the Narrows of Cienega Creek has occurred repeatedly from removal of numerous vehicles used for smuggling activities which have become mired in the marshy streambed. Other impacts from human caused fires, litter, human waste and off-road travel by vehicles are anticipated to continue to increase dramatically. The increased visitation from smuggling activities has a cumulative added negative impact when considered with the impacts of legal visitors to the area. The impacts from smuggling activities are considered unavoidable adverse impacts.**

Virtually all potential unavoidable adverse impacts are indirect, long-term, and difficult to quantify.